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Drug Abuse Warning Network, 2004: National Estimates of Drug-Related Emergency Department Visits

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Substance Abuse and Mental Health Services Administration
http://DAWNinfo.samhsa.gov/

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ORIGINATING OFFICE

Substance Abuse and Mental Health Administration
Office of Applied Studies
1 Choke Cherry Road, Room 7-1044, Rockville, MD 20857
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HIGHLIGHTS

This publication presents national estimates of drug-related visits to hospital emergency departments (EDs) for 2004, based on data from the Drug Abuse Warning Network (DAWN). These estimates pertain to the entire U.S., including Alaska, Hawaii, and the District of Columbia. The Substance Abuse and Mental Health Services Administration (SAMHSA) is the agency responsible for DAWN. SAMHSA is required to collect data on drug-related emergency department visits under section 505 of the Public Health Service Act.

DAWN estimates for 2004 are the first to be based on the new, redesigned sample of hospitals, which covers the entire U.S. Estimates for 2004 also cover a full 12-month period for the first time since the redesign of DAWN was introduced.[1] Therefore, the estimates in this publication establish a new baseline against which subsequent years' estimates may be compared. No comparisons with prior years should be made.

DAWN relies on a national sample of general, non-Federal hospitals operating 24-hour EDs. The sample is national in scope, with oversampling of hospitals in selected metropolitan areas. Estimates for 2004 are based on data submitted by 417 hospitals. In each participating hospital, ED medical records are reviewed retrospectively to find the ED visits that were related to recent drug use. All types of drugs—illegal drugs, prescription and over-the-counter pharmaceuticals, dietary supplements, and nonpharmaceutical inhalants—are included. Alcohol, when it is the only drug implicated in a visit, is included for patients younger than age 21; alcohol, when it is present in combination with another drug, is included for patients of all ages.

Total drug-related ED visits

Of an estimated 106 million ED visits in the U.S. during 2004, DAWN estimates that 1,997,993 (95% confidence interval (CI): 1,708,205 to 2,287,781) were drug-related.[2]

ED visits involving drug misuse/abuse

Out of a total of nearly 2 million drug-related ED visits in 2004, DAWN estimates that nearly 1.3 million ED visits were associated with drug misuse or abuse. Of those ED visits involving drug misuse or abuse:

- 30% involved illicit drugs only,
- 25% involved pharmaceuticals only,
- 15% involved illicit drugs and alcohol,
- 8% involved illicit drugs with pharmaceuticals, and
- 14% involved illicit drugs with pharmaceuticals and alcohol.

[1] For more information about the redesign of DAWN, see Substance Abuse and Mental Health Services Administration, Office of Applied Studies. *Drug Abuse Warning Network, 2003: Interim National Estimates of Drug-Related Emergency Department Visits*. DAWN Series D-26, DHHS Publication No. (SMA) 04-3972, Rockville, MD, 2004. This and other DAWN publications are available online at http://dawninfo.samhsa.gov/.

[2] The confidence interval accounts for the margin of error of the estimate. It indicates, with a high degree of confidence, that the true population value was between 1,708,205 and 2,287,781 drug-related ED visits.

Illicit drugs in ED visits

For 2004, DAWN estimates 940,953 (CI: 773,124 to 1,108,782) drug-related ED visits involved a major substance of abuse. DAWN estimates that:

- Cocaine was involved in 383,350 (CI: 284,170 to 482,530) ED visits.
- Marijuana was involved in 215,665 (CI: 175,930 to 255,400) ED visits.
- Heroin was involved in 162,137 (CI: 122,414 to 201,860) ED visits.
- Stimulants, including amphetamines and methamphetamine, were involved in 102,843 (CI: 61,520 to 144,166) ED visits.
- Other illicit drugs, such as PCP, Ecstasy, and GHB, were much less frequent than any of the above.

Taking the margin of error into account, the stimulants (amphetamines and methamphetamine) may be as frequent as heroin in drug-related ED visits, but the stimulants are less frequent than cocaine or marijuana. Since some drug screens test for amphetamines only as a class, an amphetamine-positive result could indicate amphetamine or methamphetamine.

After taking population size and the margin of error into account:

- The rates of ED visits involving cocaine, marijuana, heroin, and stimulants did not differ between males and females.
- The rates for patients aged 21 to 54 tended to be similar for cocaine and heroin, with lower rates for younger and older patients.
- For marijuana, the rates were highest for patients aged 18 to 24.
- For stimulants, the rates were highest for patients aged 18 to 44.

Alcohol and drug-related ED visits

DAWN estimates that, for 2004, 461,809 (CI: 375,820 to 547,798) drug-related ED visits involved alcohol in combination with another drug or alcohol alone in a patient under the age of 21. Thus, nearly a quarter (23%) of all drug-related ED visits involved alcohol in one of these forms. Since DAWN does not account for ED visits involving alcohol alone in adults, the actual number of ED visits involving alcohol is higher. Alcohol is reported to DAWN when it is present in combination with other drugs, regardless of the patient's age.

Alcohol in combination with other drugs

In 2004, DAWN estimates that 363,641 (CI: 289,516 to 437,766) ED visits involved the use of alcohol in combination with another drug. Alcohol was most frequently combined with:

- Cocaine alone (that is, with no other drug, in 83,816 ED visits),
- Marijuana alone (33,954 ED visits),
- Cocaine and marijuana (19,697 ED visits), and
- Heroin alone (14,669 ED visits).

Alcohol in patients under age 21

Considering ED visits only for patients under the age of 21, DAWN estimates 96,809 (CI: 76,127 to 117,491) drug-related ED visits involved alcohol and no other drug.

Injuries were diagnosed in 29% of the alcohol-only visits, and accidents involving falls or motor vehicles were diagnosed in 7%. Most (85%) of these visits resulted in patients being treated and released, usually to home; another 9% were admitted to inpatient units.

Taking population size and the margin of error into account:

- The rate of alcohol-only ED visits for patients aged 18 to 20 (456 visits per 100,000 population) was nearly three times that for patients aged 12 to 17 (157 per 100,000).
- The rates for males and females were equivalent.

Alcohol use by minors also occurs in combination with other drugs. Considering alcohol only and alcohol in combination with other drugs, DAWN estimates 60,118 (CI: 44,918 to 75,318) drug-related ED visits for patients aged 12 to 17 and 82,583 (CI: 67,853 to 97,313) drug-related ED visits for patients aged 18 to 20.

Non-medical use of pharmaceuticals and drug-related ED visits

DAWN estimates 495,732 (CI: 408,285 to 583,179) ED visits in 2004 for non-medical use—i.e., misuse or abuse—of prescription or over-the-counter (OTC) pharmaceuticals. Multiple drugs were involved in more than half (57%) of these ED visits. The most frequent drugs in these visits were central nervous system (CNS) agents (53% of visits) and psychotherapeutic agents (48% of visits).

Among the CNS agents, the most frequent drugs were opiate/opioid analgesics (32% of visits involving non-medical use), including single-ingredient (e.g., oxycodone) and combination forms (e.g., hydrocodone with acetaminophen). Methadone and single-ingredient and combination forms of oxycodone and hydrocodone were the most frequent opioids, occurring in similar numbers of visits:

- Methadone in 31,874 ED visits (CI: 23,752 to 39,996),
- Oxycodone/combinations in 36,559 ED visits (CI: 28,964 to 44,154), and
- Hydrocodone/combinations in 42,491 ED visits (CI: 31,831 to 53,151).

It is not possible to know the extent to which the source of these drugs is a legitimate prescription versus other sources nor is it possible to distinguish methadone used for treatment of opiate addiction from the methadone in pill form that is prescribed for pain.

Among the psychotherapeutic agents, the anxiolytics (anti-anxiety agents), sedatives, and hypnotics are the most frequent, occurring in more than a third (35%) of visits associated with pharmaceutical misuse/abuse. ED visits involving benzodiazepines clearly outnumber those involving any of the other types of psychotherapeutic agents. DAWN estimates that 144,385 (CI: 115,520 to 173,250) ED visits associated with pharmaceutical misuse/abuse involved benzodiazepines in 2004. This is comparable to the number for opiates/opioids.

Taking population size and the margin of error into account:

- ED visit rates for non-medical use of pharmaceuticals did not differ between females (186 visits per 100,000 population) and males (151 per 100,000 population).
- In terms of age, visit rates were highest for patients aged 18 to 44.

Special types of drug-related ED visits

Suicide attempts

DAWN estimates 121,585 (CI: 108,955 to 134,215) drug-related ED visits associated with suicide attempts for 2004. The majority of suicide attempt ED visits involved multiple drugs (64%).

In these ED visits for drug-related suicide attempts in 2004:

- Fewer than one-third (31%) involved alcohol.
- CNS agents, primarily analgesics (pain relievers), were involved in slightly less than half (47%) and included both prescription and OTC formulations.
- Over 56% of suicide-related visits included psychotherapeutic agents, such as benzodiazepines or antidepressants.
- Illicit drugs, such as cocaine (11% of visits) and marijuana (8% of visits), were relatively infrequent.

Seeking detox

DAWN estimates 177,879 (CI: 70,845 to 284,913) drug-related ED visits for patients seeking detox or substance abuse treatment services during 2004. However, these visits tend to be concentrated in hospitals with administrative policies that require medical clearance in the ED for admission to these specialized units.

More than 60% of ED visits for seeking detox involved multiple drugs. Both illicit and prescription drugs were common in these visits:

- Cocaine (46% of visits) and heroin (30% of visits) were followed in frequency by marijuana (15% of visits) and amphetamine or methamphetamine stimulants (7% of visits).
- Alcohol in combination with another drug was implicated in about a third (33%) of seeking detox ED visits.

Among the seeking detox ED visits, 7 out of 10 received some type of follow-up care, either inpatient admission, referral elsewhere for detox or substance abuse treatment services, or transfer to another health care facility. However, a quarter of seeking detox cases may not have received the care they sought because they were discharged to home.

INTRODUCTION

This publication presents final estimates of drug-related emergency department (ED) visits from the Drug Abuse Warning Network (DAWN) for 2004. DAWN is a public health surveillance system that monitors drug-related emergency department (ED) visits for the nation and for selected metropolitan areas. DAWN also collects data on drug-related deaths investigated by medical examiners and coroners in selected metropolitan areas and States. The Office of Applied Studies (OAS) of the Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services, has been responsible for DAWN operations since 1992.

Major changes to DAWN were instituted at the beginning of 2003. These changes are the result of a redesign that, among other improvements, altered most of DAWN's core features, including the design of the hospital sample and the cases eligible for DAWN. These improvements create a permanent disruption in trends. As a result, comparisons cannot be made between old DAWN (2002 and prior years) and the new DAWN.

This publication presents national estimates of drug-related ED visits for 2004, based on data collected between January 1, 2004 and December 31, 2004. These are final estimates and the first full-year estimates from the new DAWN. Therefore, no trends are presented in this publication.

The findings based on the new DAWN hospital sample are representative of the entire United States, and, as such, they are generalizable to all 50 States and the District of Columbia.

Major features of DAWN

What is a DAWN case?

One of the most important features of DAWN is its expansive definition of a case:

A DAWN case is any ED visit related to recent drug use.

DAWN includes ED visits associated with substance abuse/misuse, both intentional and accidental. DAWN also includes ED visits related to the use of drugs for legitimate therapeutic purposes. To be a DAWN case, the relation between the ED visit and the drug need not be causal; the drug needs only to be implicated in the visit.

The case criteria are intended to be broad and inclusive and to have few exceptions. DAWN cases are found through a retrospective review of medical records.[3] Broad criteria take into account the fact that documentation in medical records varies in clarity and comprehensiveness across hospitals and among clinicians within hospitals. Broad criteria minimize the potential for judgments that could cause data to vary systematically and unexpectedly across reporters and hospitals. In addition, broad criteria are designed to capture a very diverse set of drug-related cases, which can be aggregated and disaggregated to serve a variety of analytical purposes and the interests of multiple audiences. In DAWN, only recent drug use is included;[4] the reason a patient used a drug is irrelevant; and the criteria are broad enough to encompass all types of drug-related events, including, but not limited to, explicit drug abuse.

[3] This review is conducted by data collectors called "DAWN reporters."

[4] That is, patients with a history of drug use (and no recent use) are excluded.

There are a few clearly delineated exceptions to the DAWN case criteria. An ED visit is not a DAWN case if:

- There is no evidence of recent drug use.
- The patient left the ED without being treated.
- The patient consumed a non-pharmaceutical substance but did not inhale it.
- The patient has a history of drug use but no recent use.
- Alcohol is the only substance involved and the patient is an adult (aged 21 or over).
- The only documentation of a drug is in toxicology test results.
- The only drugs listed (e.g., current medications) are not related to the visit.
- The patient is being treated for a consequence of undermedication (i.e., taking too little of a drug).

Types of cases in DAWN

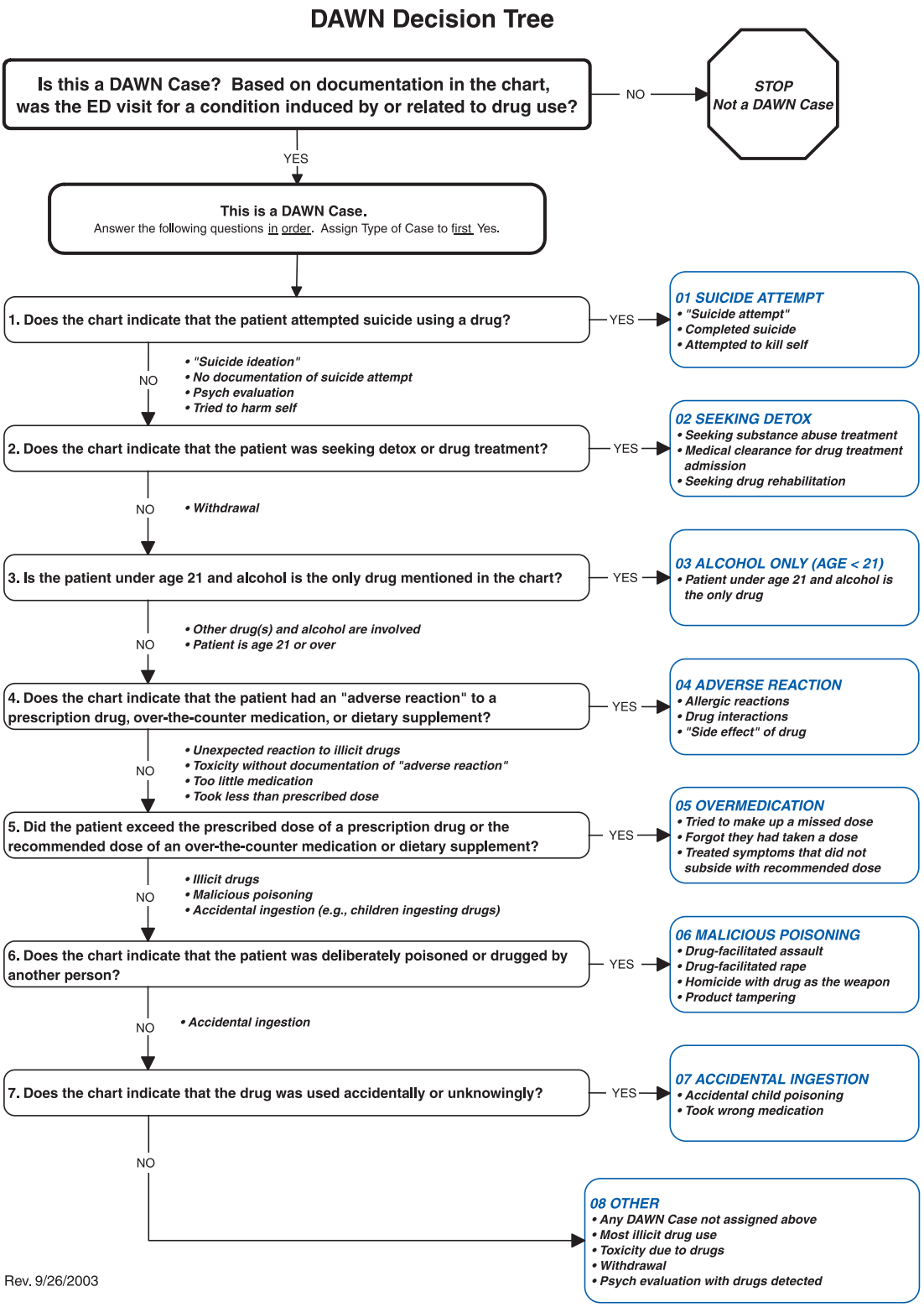
By design, the broad case criteria yield a diverse set of cases in DAWN. To bring order to this heterogeneous mix of DAWN cases, each case is assigned to one of eight case types, which may be analyzed separately or in purposeful combinations. The eight case types are:

- Suicide attempt,
- Seeking detox,
- Alcohol only in patients under age 21,
- Adverse reaction,
- Overmedication,
- Malicious poisoning (includes drug-facilitated sexual assault or product tampering),
- Accidental ingestion, and
- *Other*.

Each DAWN case is assigned hierarchically into one and only one case type based on a series of questions and rules. To assign case type, DAWN reporters use a decision tree, a graphical depiction of the logic of the case type assignment rules (Figure 1). Cases are classified into the first case type that applies. Even if a case might fit into more than one type, it is assigned to the first one that applies. The case types were ordered with this in mind.

Figure 1

Type of case decision tree



The final category, the case type called *other*, is reserved for DAWN cases that do not meet any of the rules for classification into one of the first seven types. By design, most cases of drug abuse are classified as case type *other*. This approach, which never directly identifies drug abuse, comes from the recognition that medical records frequently lack explicit documentation of substance abuse. This lack of documentation may occur for several reasons. First, the distinctions among use, misuse, and abuse of drugs are often subjective. Second, if there is a low index of suspicion for drug abuse in some types of patients, ED physicians may be unlikely to label those types of patients as drug abusers. Third, in many States, insurers may legally deny payment for ED visits related to substance abuse. Thus, financial incentives may be a factor to influence documentation practices.

With these eight case types DAWN includes some ED visits that are unrelated to drug abuse. However, using the hierarchical decision tree is a method for isolating a set of cases involving drug abuse or misuse.

What drugs are included in DAWN?

DAWN includes all types of drugs.[5] Drugs in DAWN include:

- Illegal drugs, such as heroin, cocaine, marijuana, and Ecstasy;
- Prescription drugs, such as Prozac®, Vicodin®, OxyContin®, alprazolam, and methylphenidate;
- Over-the-counter (OTC) medications, including aspirin, acetaminophen, ibuprofen, and multi-ingredient cough and cold remedies;
- Dietary supplements, including vitamins, herbal remedies, and nutritional products;
- Psychoactive, non-pharmaceutical inhalants;
- Alcohol in combination with other drugs; and
- Alcohol alone, in patients aged less than 21 years.

To be reportable, a non-pharmaceutical substance must be consumed by inhalation, sniffing, or snorting, and it must have a psychoactive effect when inhaled. An ED visit involving inhalation of a non-pharmaceutical, psychoactive substance and no other drug qualifies as a DAWN case. Carbon monoxide is excluded from the inhalants. Beginning in 2004, cases involving accidental exposures (e.g., exposure to paint fumes while painting a closet) are excluded as well.

Other DAWN features

Several methods are used to improve the quality and reliability of DAWN data. These include:

- Case finding by a retrospective review of ED medical records for every patient treated in a participating ED;
- Electronic reporting with automated prompts and data validation;
- Inclusion of data items on the health effects of drug use and additional detail on patient disposition;
- Elimination of incidental drug reporting;
- Emphasis on accurate, specific, and non-redundant drug reporting;
- Inclusion of data items to identify drugs confirmed by laboratory testing;

[5] The classification of drugs used in DAWN is derived from the Multum *Lexicon*, Copyright 2004, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2004). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

- Systematic training and certification of DAWN reporters; and
- In-house review and cleaning of DAWN case reports.

The case report form showing all the DAWN data items is provided in Figure 2.

Estimates in this publication

Estimates in this publication were calculated from a probability sample of hospitals by applying sampling weights to data from the sample and accounting for the survey design. Only national estimates pertaining to the U.S. are provided.

Estimates for 2004 are, for the first time, representative of the entire 50 States and the District of Columbia. Hospitals eligible for the DAWN sample are non-Federal, short-stay, general, surgical and medical hospitals in the U.S. that operate 24-hour EDs. The American Hospital Association's (AHA's) 2001 Annual Survey is the source of the sampling frame. (For a definition of sampling frame and other technical terms used in this publication, see Appendix C, Glossary of Terms.)

The DAWN sample of hospitals includes an oversampling of hospitals in selected metropolitan areas supplemented with a sample of hospitals from the remainder of the U.S., which includes other metropolitan areas as well as non-metropolitan and rural areas. The metropolitan area boundaries correspond to the definitions issued by the Office of Management and Budget (OMB) in June 2003.

For 2004, the national estimates are calculated as the sum of the estimates from 16 geographic areas (15 metropolitan areas, divisions, and subareas and the remainder of the U.S.). The sampling weights consist of three components:

- The base sampling weight, calculated as the reciprocal of the sampling probability;
- An adjustment for nonresponse, based either on complete nonparticipation or failure to provide data on all the reporting days in a given time period; and
- A post-stratification factor to adjust the total number of ED visits among participating sample hospitals to the total for the eligible population of hospitals as determined from the sampling frame.

The nonresponse adjustment to the sampling weights is designed to account for data that are missing, but not for data that are incomplete. Therefore, the data used for this publication were subjected to an intense level of scrutiny. The procedures observed for 2004 differed somewhat from those applied in 2003 due to the increased volume of data. For 2004, DAWN case eligibility and assignment of type of case were subjected to a multi-stage review involving automated "expert system" processing with selective manual verification. First, each record submitted as a DAWN case was reviewed by an expert system, which assigned a probability that the record met DAWN case criteria. Records not meeting minimum probability thresholds, as well as a subsample of those that did, were reviewed by DAWN staff for final case eligibility determinations. Second, the expert system reviewed data items submitted on each DAWN case and assigned a probability for each case type. The case type with the highest probability was compared with the case type originally reported on the record. When these agreed, the case was flagged as final. When these disagreed or when the

Figure 2
DAWN ED case form

FOR SAMHSA USE ONLY
FORM NUMBER

Department of Health and Human Services • Substance Abuse and Mental Health Services Administration

Drug Abuse Warning Network (DAWN)
Emergency Department Case Form

FORM APPROVED
OMB. NO. 0930-0078
EXPIRES 12/31/2005

1. Facility ID ☐☐☐☐☐☐☐

2. Cross-reference *(for facility use only)* ■■■■■■■■■■

PATIENT INFORMATION

3. Date of Visit
MONTH ☐☐ DAY ☐☐ YEAR 2 0 ☐☐

4. Time of Visit
HOUR ☐☐ MINUTES ☐☐
1 ✝ a.m.
2 ✝ p.m.
3 ✝ military

5. Age
☐☐☐
1 ✝ Less than 1 year
8 ✝ Not documented

6. Patient's Home ZIP Code
☐☐☐☐☐
Otherwise, mark [x] one response:
1 ✝ No fixed address (e.g., homeless)
2 ✝ Institution (e.g., shelter/jail/hospital)
8 ✝ Not documented

7. Sex
1 ✝ Male
2 ✝ Female
8 ✝ Not documented

8. Race/Ethnicity
Mark [x] one or more:
✝ White
✝ Black or African American
✝ Hispanic or Latino
✝ Asian
✝ American Indian or Alaska Native
✝ Native Hawaiian or Other Pacific Islander
✝ Not documented

9. Case Description *Describe how the drug(s) was related to the ED visit. Copy verbatim from the patient's chart when possible.*

10. Chief Complaint *Mark [x] all that apply:*
✝ Overdose
✝ Intoxication
✝ Seizures
✝ Altered mental status
✝ Psychiatric condition
✝ Withdrawal
✝ Seeking detox
✝ Accident/injury/assault
✝ Abscess/cellulitis/skin/tissue
✝ Chest pain
✝ Respiratory problems
✝ Digestive problems
✝ Other (specify): _____

11. Substance(s) Involved *Using available documentation, list all substances that caused or contributed to the ED visit. Record substances as specifically as possible (i.e., brand [trade] name preferred over generic name preferred over chemical name, etc.). Do not record the same substance by two different names.*

SAMHSA USE ONLY								**Substance** *(record verbatim)*	*Mark [x] if confirmed by toxicology test*	**Route of Administration** *Circle one:* Oral	Injected	Inhaled, sniffed, snorted	Smoked	Other	Not documented
1									✝	1	2	3	4	5	8
2									✝	1	2	3	4	5	8
3									✝	1	2	3	4	5	8
4									✝	1	2	3	4	5	8
5									✝	1	2	3	4	5	8
6									✝	1	2	3	4	5	8
7	C	2	0	0	0	2	9	Alcohol involved? 1 ✝ Yes 2 ✝ No 8 ✝ Not documented	✝	1	2	3	4	5	8

12. Type of Case
Mark [x] the first category that applies:
01 ✝ Suicide attempt
02 ✝ Seeking detox
03 ✝ Alcohol only (age < 21)
04 ✝ Adverse reaction
05 ✝ Overmedication
06 ✝ Malicious poisoning
07 ✝ Accidental ingestion
08 ✝ Other

13. Diagnosis *List up to 4 diagnoses noted in the patient's chart. Do not list ICD codes.*
1 _____ 3 _____
2 _____ 4 _____

14. Disposition *Mark [x] one:*

Treated and released:
01 ✝ Discharged home
02 ✝ Released to police/jail
03 ✝ Referred to detox/ treatment

Admitted to this hospital:
04 ✝ ICU/Critical care
05 ✝ Surgery
06 ✝ Chemical dependency/detox
07 ✝ Psychiatric unit
08 ✝ Other inpatient unit

Other disposition:
09 ✝ Transferred
10 ✝ Left against medical advice
11 ✝ Died
96 ✝ Other
98 ✝ Not documented

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case type probability did not meet a minimum threshold, the case was reviewed manually to resolve the differences. An additional 10% of cases were reviewed manually as a quality control check. Third, all data were checked for internal consistency, out-of-range values, missing data, and adherence to skip patterns at data entry and during subsequent cleaning processes.

A fourth and final review focused explicitly on the issue of incomplete data, that is, DAWN cases missed due to incomplete chart review or inappropriate application of the case criteria. This review used statistical process control methods and information gained from on-site quality audits to identify and evaluate unexpected variability across months in the number of medical charts reviewed and the number of DAWN cases submitted for each hospital.

Hospital participation in 2004 (Table 1)

For 2004, 417 hospitals submitted data that were used for estimation. The weighted response rate varied from 47.4% in the San Francisco Division of the San Francisco Metropolitan Statistical Area (MSA) to 78.1% in the Buffalo, NY MSA. The weighted response rate for hospitals covering the U.S. outside of the 15 metropolitan areas, divisions, and subareas was 35.3%.

Across the 417 participating hospitals, more than 12 million charts were reviewed to find the drug-related visits that met the DAWN case criteria. Based on the review of charts, 279,564 drug-related visits were found and submitted. On average, a DAWN member hospital submitted 670 DAWN cases. However, the number of cases varied widely, from 4 cases to 7,485 (median 402) in a single hospital during 2004.

The margin of error

Since DAWN relies on a sample of hospitals, each estimate produced from the DAWN ED sample data is subject to sampling variability, the so-called "margin of error." This is the variation in the estimate that would be observed naturally if different samples were drawn from the same population using the same procedures. The sampling variability of an estimate in this publication is measured by its relative standard error (RSE), which is defined as the standard error of the estimate expressed as a percentage of the value of the estimate. The precision of an estimate is inversely related to its sampling variability as measured by the RSE. The greater the RSE, the lower the precision.

DAWN estimates with RSE values greater than 50% and estimates less than 30 are regarded as too imprecise for publication and are not shown. In the tables, three dots ("…") are shown in the place of estimates that have an RSE greater than 50% or estimates less than 30. Ratios (percentages or rates per 100,000 population) based on suppressed estimates are likewise suppressed. Gray shading in a cell indicates that the cell is not applicable. For example, no drugs other than alcohol can be present in the "alcohol only" case type category.

In this publication, confidence intervals (CIs) are included in many of the tables and are cited in the text along with the estimates. A CI, which is expressed as a range of values, does a better job of reflecting the true nature of the statistical estimates because it takes both the estimate and its margin of error into account. A 95% CI means that, if repeated samples were drawn from the same population of hospitals using the same sampling and data collection procedures, the true population value would fall within the confidence interval 95% of the time.

For readers unfamiliar with these concepts, a more detailed discussion and examples are provided in Appendix B.

Table 1

DAWN ED sample and response rates: 2004

Geographic area	Total eligible hospitals[1]	Eligible hospitals in sample	Responding hospitals in sample	Response rate for sample hospitals	Response rate for visits (weighted)
Total U.S.[2]	**4,438**	**951**	**417**	**43.8**	**47.6**
Metropolitan Statistical Areas (MSAs)[3]					
Atlanta-Sandy Springs-Marietta, GA MSA	41	31	15	48.4	57.8
Boston-Cambridge-Quincy, MA-NH MSA	41	30	16	53.3	59.6
Buffalo-Cheektowaga-Tonawanda, NY MSA	14	14	8	57.1	78.1
Chicago-Naperville-Joliet, IL-IN-WI MSA	91	75	34	45.3	47.5
Denver-Aurora, CO MSA	14	14	8	57.1	65.0
Detroit-Warren-Livonia, MI MSA	38	26	20	76.9	72.6
New Orleans-Metairie-Kenner, LA MSA	21	21	10	47.6	68.9
Phoenix-Mesa-Scottsdale, AZ MSA	25	25	11	44.0	52.5
St. Louis, MO-IL MSA	37	37	17	45.9	49.1
San Diego-Carlsbad-San Marcos, CA MSA	17	17	10	58.8	61.4
Seattle-Tacoma-Bellevue, WA MSA	22	22	12	54.5	54.9
Washington-Arlington-Alexandria, DC-VA-MD-WV MSA	34	30	14	46.7	53.0
Metropolitan Divisions and Subareas[3]					
Miami-Miami Beach-Kendall, FL Metropolitan Division of Miami-Fort Lauderdale-Miami Beach, FL MSA	21	17	11	64.7	68.9
Bronx, Kings, New York, Queens, Richmond Counties of New York-Newark-Edison, NY-NJ-PA MSA	52	40	26	65.0	75.1
San Francisco-San Mateo-Redwood City, CA Metropolitan Division of San Francisco-Oakland-Fremont, CA MSA	18	18	9	50.0	47.4

[1] Short-term, general, non-Federal hospitals with 24-hour emergency departments, based on the American Hospital Association (AHA) Annual Survey, are eligible for DAWN.

[2] Total eligible hospitals in the U.S. include eligible hospitals from metropolitan areas shown and the remainder of the U.S. Therefore, components shown do not sum to the total.

[3] Metropolitan Statistical Areas (MSAs) and Metropolitan Divisions follow the standard definitions issued by the Office of Management and Budget in June 2003 (available at http://www.whitehouse.gov/omb/bulletins/b03-04.html), with one exception: For New York, geographic coverage is limited to the subarea comprising the five Boroughs of New York City.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Estimates adjusted for population size

Standardized measures are needed to make valid comparisons of ED visits and drugs across age and gender categories that differ in population size. For age in particular, the size of the underlying population differs considerably across age groups; for example, the number of individuals aged 18 to 20 in the U.S. is much lower than the number of individuals aged 35 to 44.

To take the size of the underlying population into account, rates of ED visits per 100,000 people are generated using population data from the U.S. Bureau of the Census.[6] An example is provided in Appendix B, and the population estimates used for this publication can be found in Appendix D.

Standardized rates are not calculated for race and ethnicity subgroups because the race and ethnicity categories available to DAWN are much less detailed and contain considerably more missing data than the race and ethnicity categories in the Census data. Appendix E describes the race and ethnicity data reported to DAWN.

[6] Population estimates for 2004, as of July 2005, from U.S. Census Bureau County Population Dataset CO-EST2004-ALLDATA (see http://www.census.gov/popest/counties/files/CO-EST2004-ALLDATA.csv).

Total drug-related ED visits (Table 2)

Estimates for the entire universe of DAWN-eligible hospitals in the U.S. are produced by applying sampling weights to the data received from the sampled hospitals. Thus, for 2004, 279,564 submitted cases are extrapolated to an estimate of 1,997,993 drug-related ED visits. Considering the margin of error, this estimate may range from 1,708,205 to 2,287,781 drug-related ED visits out of nearly 106 million total ED visits estimated for the U.S.

On average, a drug-related ED visit involved 1.6 drugs.

Drug-related ED visits by type of case (Figure 3)

The distribution of drug-related ED visits across the eight case types is illustrated in Figure 3. Estimates for the U.S. show the largest number of cases (35%) fell into the category other. Adverse reaction, which accounted for 30% of drug-related ED visits, is second in frequency, followed by overmedication (12%). Patients seeking detox accounted for 9% of drug-related ED visits. Suicide attempt, which was narrowly defined, accounted for 6% of drug-related visits. Visits associated with underage alcohol consumption and no other drug (alcohol only) accounted for 5% of drug-related ED visits, accidental ingestion 3%, and malicious poisoning 0.3%.

Drug misuse and abuse in ED visits (Table 3)

Among the nearly 2 million ED visits that were drug-related in 2004, DAWN estimates nearly 1.3 million were associated with drug misuse or abuse. This figure includes 940,953 (CI: 773,124 to 1,108,782) drug-related ED visits that involved illicit drugs or alcohol, and 495,732 (CI: 408,285 to 583,179) ED visits associated with non-medical use of pharmaceuticals.

ED visits involving illicit drugs alone accounted for 30% of all visits related to drug misuse/abuse in 2004. ED visits involving non-medical use of pharmaceuticals alone accounted for another 25%. Only 8% of drug misuse/abuse visits were related to consumption of alcohol by a minor. The remaining visits (37%) involved some combination of illicit drugs, alcohol, and/or pharmaceuticals.

ED visits in each of the three major categories—illicit drugs, alcohol, and non-medical use of pharmaceuticals—are discussed in greater detail in separate sections in the remainder of this publication.

Table 2

Drug-related ED visits, by type of case: 2004

Drug-related ED visits

Type of case	Unweighted sample data	Weighted estimates[1]	Relative standard error (RSE)	95% Confidence interval		
				Lower bound	-	Upper bound
Suicide attempt	16,169	121,585	5.3	108,955	-	134,215
Seeking detox	28,800	177,879	30.7	70,845	-	284,913
Alcohol only (age < 21)	11,315	96,809	10.9	76,127	-	117,491
Adverse reaction	71,175	592,044	8.9	488,768	-	695,320
Overmedication	28,707	244,330	10.5	194,046	-	294,614
Malicious poisoning	747	6,026	16.6	4,066	-	7,986
Accidental ingestion	5,796	57,940	7.0	49,990	-	65,890
Other	116,855	701,381	10.6	555,663	-	847,099
Total drug-related visits	**279,564**	**1,997,993**	**7.4**	**1,708,205**	**-**	**2,287,781**
Total ED visits (all reasons)	**15,568,029**	**105,978,433**	**7.5**	**90,399,603**		**121,557,263**

Drugs

Type of case	Unweighted sample data	Weighted estimates[2]	Relative standard error (RSE)	95% Confidence interval		
				Lower bound	-	Upper bound
Suicide attempt	34,009	266,459	6.1	234,601	-	298,317
Seeking detox	56,272	357,467	32.9	126,957	-	587,977
Alcohol only (age < 21)	11,315	96,809	10.9	76,127	-	117,491
Adverse reaction	92,571	742,916	9.1	610,410	-	875,422
Overmedication	49,893	447,466	11.1	350,115	-	544,817
Malicious poisoning	1,320	10,416	17.0	6,945	-	13,887
Accidental ingestion	7,398	73,992	6.6	64,421	-	83,563
Other	202,018	1,291,276	9.8	1,019,010	-	1,503,542
Drugs in all drug-related visits[2]	**454,796**	**3,256,802**	**7.4**	**2,784,436**	**-**	**3,729,168**

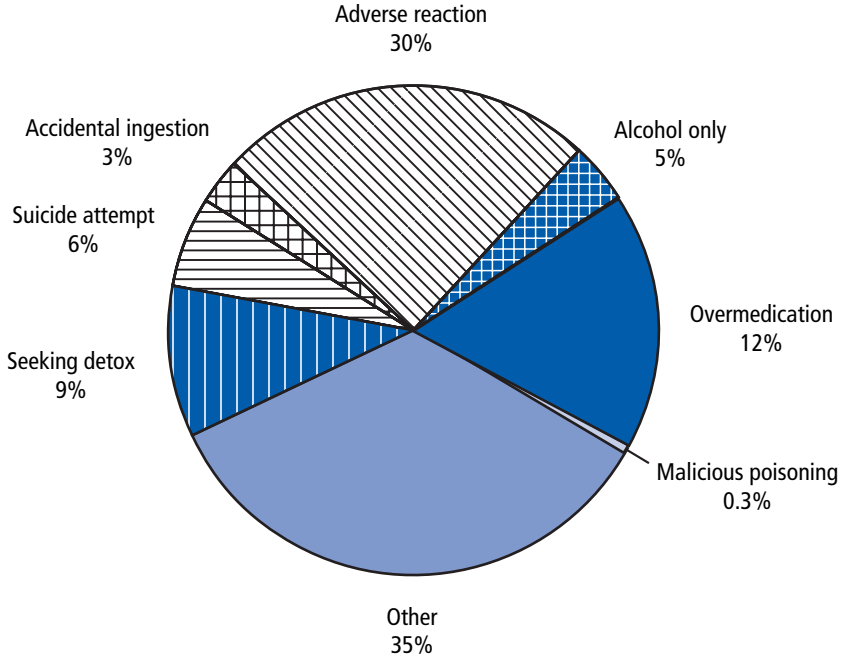
[1] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

[2] These are estimates of drugs. A single ED visit may involve multiple drugs.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Figure 3

Drug-related ED visits, by type of case: 2004



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Table 3

Drug misuse and abuse in ED visits in the U.S., by type of drug involvement: 2004

Drug involvement[1]	Estimated visits[2,3]	Percent
All types of drug misuse/abuse	**1,254,078**	**100%**
Illicit drugs only	379,609	30%
Alcohol only (age < 21)	98,174	8%
Pharmaceuticals only	313,125	25%
Combinations		
Illicit drugs with alcohol[4]	190,747	15%
Illicit drugs with pharmaceuticals	99,535	8%
Alcohol with phamaceuticals	125,374	10%
Illicit drugs with alcohol and pharmaceuticals	47,515	4%

1 This classification of drugs is derived from the Multum *Lexicon*, Copyright 2005, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2005). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

2 These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

3 Estimates are all expressed in visits.

4 DAWN excludes alcohol-only visits for adults. Alcohol, when present with other drugs, is included for all ages.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

ILLICIT DRUGS IN ED VISITS

The first method for assessing drug abuse in new DAWN focuses on illicit drugs, regardless of case type.

For 2004, DAWN estimates 940,953 (CI: 773,124 to 1,108,782) drug-related ED visits that involved a major substance of abuse (Table 4). This means that nearly half (47%) of all the drug-related ED visits during the year involved alcohol or an illicit drug.

DAWN estimates that cocaine was involved in 383,350 (CI: 284,170 to 482,530) ED visits. In other words, approximately one in five drug-related ED visits (19%) involved cocaine.

Marijuana was involved in 215,665 (CI: 175,930 to 255,400) ED visits. Thus, marijuana may be only slightly less common than cocaine in drug-related ED visits.

Heroin was involved in 162,137 (CI: 122,414 to 201,860) drug-related ED visits or 8% of drug-related ED visits overall. This could, however, be an underestimate. Heroin is an opiate, and some drug screens test for opiates only as a class. About three-quarters (74%) of reports of "opiates" submitted to DAWN for 2004 came from toxicology findings, so some unknown quantity of these may have been heroin. The number of unspecified opiates in drug-related ED visits is estimated at 37,007 (CI: 28,738 to 45,276) visits, or 2% of all drug-related ED visits.

Stimulants, including amphetamines and methamphetamine, were involved in 102,843 (CI: 61,520 to 144,166) ED visits, about 5% of drug-related ED visits overall. Amphetamines and methamphetamine are combined for this analysis because more than 8 out of 10 (86%) amphetamine reports are derived from toxicology findings.[7] Since some drug screens test for amphetamines only as a class, an amphetamine-positive result could indicate amphetamine or methamphetamine.

Other illicit drugs appeared at much lower frequencies. For 2004, DAWN estimates:

- MDMA (Ecstasy) in 8,621 (CI: 5,985 to 11,257) ED visits,
- GHB in 2,340 (CI: 125 to 4,555) ED visits,
- Ketamine in 227 (CI: 109 to 345) ED visits,
- LSD in 1,953 (CI: 1,179 to 2,727) ED visits,
- PCP in 8,928 (CI: 4,920 to 12,936) ED visits, and
- Miscellaneous hallucinogens in 3,445 (CI: 2,202 to 4,688) ED visits.

By design, DAWN excludes illicit drugs from all case types except suicide attempt, seeking detox, malicious poisoning, and *other*. Also by design, most illicit drug use will be classified in case type other, with most of the remainder in suicide attempts and seeking detox cases (Table 5). For example:

- Cocaine was found in 11% of visits related to suicide attempt and nearly half (46%) of seeking detox visits.
- Heroin was infrequent (2%) in visits related to suicide attempt, but was present in 30% of seeking detox visits.
- Marijuana was found in 8% of visits related to suicide attempts and 15% of seeking detox visits. Marijuana was also involved in 15% of ED visits involving malicious poisoning.

[7] In 2004, only reports of amphetamines, cathinone, dimethoxymethamphetamine, and methcathinone are classified in this category. Drugs specifically identified as amphetamine-dextroamphetamine, benzphetamine, or dextroamphetamine are now classified as CNS stimulants. This is a change from 2003 when all these drugs were classified as stimulants.

Table 4

Illicit drugs and alcohol in drug-related ED visits: 2004

Drug category and selected drugs[1]	Estimated visits[2,3,4]	Relative standard error (RSE)	95% Confidence interval		
			Lower bound	-	Upper bound
Total drug-related ED visits	**1,997,993**	**7.4**	**1,708,205**	**-**	**2,287,781**
Major substances of abuse (includes alcohol)	940,953	9.1	773,124	-	1,108,782
Alcohol	461,809	9.5	375,820	-	547,798
Alcohol-in-combination	363,641	10.4	289,516	-	437,766
Alcohol alone (age < 21 only)	98,168	10.9	77,196	-	119,140
Cocaine	383,350	13.2	284,170	-	482,530
Heroin	162,137	12.5	122,414	-	201,860
Marijuana	215,665	9.4	175,930	-	255,400
Stimulants	102,843	20.5	61,520	-	144,166
Amphetamines	32,686	15.5	22,757	-	42,615
Methamphetamine	73,400	22.7	40,742	-	106,058
MDMA (Ecstasy)	8,621	15.6	5,985	-	11,257
GHB	2,340	48.3	125	-	4,555
Flunitrazepam (Rohypnol)	473	49.3	16	-	930
Ketamine	227	26.5	109	-	345
LSD	1,953	20.2	1,179	-	2,727
PCP	8,928	22.9	4,920	-	12,936
Miscellaneous hallucinogens	3,445	18.4	2,202	-	4,688
Inhalants	9,275	15.5	6,457	-	12,093
Combinations not tabulated above (NTA)	1,524	16.5	1,032	-	2,016

[1] This classification of drugs is derived from the Multum *Lexicon,* Copyright 2005, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2005). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

[2] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

[3] Estimates are all expressed in visits. For example, 383,350 visits involved cocaine, and 162,137 visits involved heroin. Visits cannot be summed across drugs because drug-related ED visits often involve multiple drugs (e.g., visits involving both cocaine and heroin would be double counted).

[4] Three dots (…) indicate that an estimate with an RSE greater than 50% or an estimate less than 30 has been suppressed.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Table 5

Illicit drugs, by type of case: 2004

Drug category and selected drugs[1]	All case types	Type of case							
		Suicide attempt	Seeking detox	Alcohol only (age < 21)	Adverse reaction	Over-medication	Malicious poisoning	Accidental ingestion	Other
Drug-related ED visits[2,3,4]									
Total drug-related ED visits	**1,997,993**	**121,585**	**177,879**	**96,809**	**592,044**	**244,330**	**6,026**	**57,940**	**701,381**
Cocaine	383,350	13,940	81,439		...	...	995	...	286,648
Heroin	162,137	2,986	53,088		...	...	111	46	105,906
Marijuana	215,665	9,747	27,259		...	...	879	148	177,380
Stimulants	102,843	4,218	12,151		...	345	810	...	84,926
Amphetamines	32,686	1,894	1,829		...	341	532	88	27,861
Methamphetamine	73,400	2,391	10,518		...	...	281	...	60,042
MDMA (Ecstasy)	8,621	278	...		...	...	...	...	7,107
GHB	2,340	...	...		...	...	231	...	1,751
Flunitrazepam (Rohypnol)	473	...	...		...	...	...	...	...
Ketamine	227	...	...		...	...	...	...	144
LSD	1,953	...	60		...	...	...	...	1,784
PCP	8,928	418	410		...	...	...	...	7,779
Miscellaneous hallucinogens	3,445	...	90		...	...	...	...	3,214
Inhalants	9,275	187	...		1,165	...	...	3,338	4,376
Combinations NTA	1,524	...	222		...	...	...	...	1,282
Percent of visits									
Cocaine	19%	11%	46%		...	...	17%	...	41%
Heroin	8%	2%	30%		...	...	2%	0%	15%
Marijuana	11%	8%	15%		...	...	15%	0%	25%
Stimulants	5%	3%	7%		...	0%	13%	...	12%
Amphetamines	2%	2%	1%		...	0%	9%	0%	4%
Methamphetamine	4%	2%	6%		...	...	5%	...	9%
MDMA (Ecstasy)	0%	0%	...		...	...	...	...	1%
GHB	0%	0%	...		...	...	4%	...	0%
Flunitrazepam (Rohypnol)	0%	...	...		...	...	...	...	...
Ketamine	0%	...	...		...	...	...	...	0%
LSD	0%	...	0%		...	...	...	0%	0%
PCP	0%	0%	0%		...	...	...	...	1%
Miscellaneous hallucinogens	0%	...	0%		...	...	...	...	0%
Inhalants	0%	0%	...		0%	...	...	6%	1%
Combinations NTA	0%	...	0%		...	...	...	...	0%

Table 5 (continued)

Illicit drugs, by type of case: 2004

Drug category and selected drugs[1]	All case types	Type of case							
		Suicide attempt	Seeking detox	Alcohol only (age < 21)	Adverse reaction	Over-medication	Malicious poisoning	Accidental ingestion	Other
	ED visits per 100,000 population[2,3,4]								
Total drug-related ED visits	**680**	**41**	**61**	**113**	**202**	**83**	**2**	**20**	**239**
Cocaine	131	5	28		...	...	0	...	98
Heroin	55	1	18		...	...	0	0	36
Marijuana	73	3	9		...	...	0	0	60
Stimulants	35	1	4		...	0	0	...	29
Amphetamines	11	1	1		...	0	0	0	9
Methamphetamine	25	1	4		...	...	0	...	20
MDMA (Ecstasy)	3	0	...		...	...	...	...	2
GHB	1	...	...		...	...	0	...	1
Flunitrazepam (Rohypnol)	0	...	...		...	...	...	...	...
Ketamine	0	...	...		...	...	...	...	0
LSD	1	...	0		...	...	...	...	1
PCP	3	0	0		...	...	...	...	3
Miscellaneous hallucinogens	1	...	0		...	...	...	...	1
Inhalants	3	0	...		0	...	...	1	1
Combinations NTA	1	...	0		...	...	...	...	0

[1] This classification of drugs is derived from the Multum *Lexicon,* Copyright 2005, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2005). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

[2] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

[3] Estimates are all expressed in visits. For example, 383,350 visits involved cocaine, and 162,137 visits involved heroin. Visits cannot be summed across drugs because drug-related ED visits often involve multiple drugs (e.g., visits involving both cocaine and heroin would be double counted).

[4] Three dots (…) indicate that an estimate with an RSE greater than 50% or an estimate less than 30 has been suppressed.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

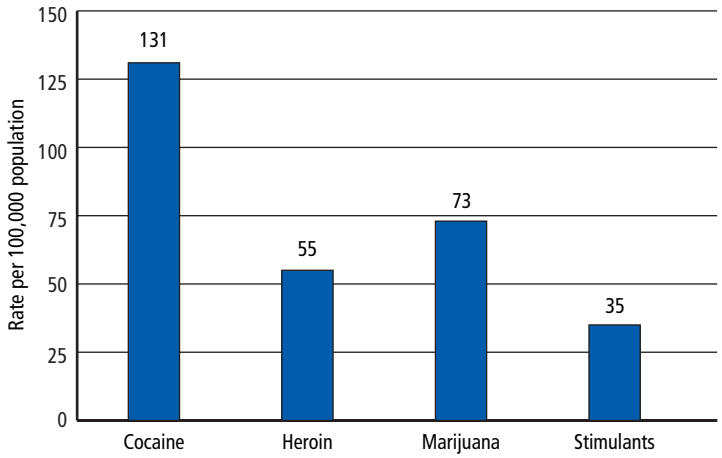
When considered in relation to the population of the U.S., ED visits associated with illicit drugs are relatively infrequent, but vary across the major drugs (Figure 4):

- 131 visits per 100,000 population for cocaine,
- 73 visits per 100,000 population for marijuana,
- 55 visits per 100,000 population for heroin, and
- 35 visits per 100,000 population for stimulants.

The rates of ED visits involving cocaine, marijuana, heroin, and stimulants did not differ between males and females after taking population size and the margin of error into account (Figure 5). The rates for patients aged 21 to 54 tended to be similar for cocaine and heroin, with lower rates for younger and older patients (Table 6 and Figure 5). For marijuana, the rates were highest for patients aged 18 to 24. For stimulants, the rates were highest for patients aged 18 to 44.

Figure 4

Illicit drugs in ED visits: 2004



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Table 6

Illicit drugs, by patient characteristics: 2004

Patient characteristics	Selected drugs[1]							
	Cocaine	Heroin	Marijuana	Stimulants	MDMA (Ecstasy)	GHB	LSD	PCP
	Drug-related ED visits[2,3,4]							
Total drug-related ED visits	**383,350**	**162,137**	**215,665**	**102,843**	**8,621**	**2,340**	**1,953**	**8,928**
Gender								
Male	249,942	108,768	141,871	58,700	4,916	1,316	1,786	5,783
Female	133,296	53,319	73,716	44,138	3,704	...	167	3,131
Unknown	112	50	78	...	...	...	...	...
Age								
0-5 years	253	...	...	...	...	...	...	...
6-11 years	...	...	380	...	...	...	...	...
12-17 years	11,539	1,400	39,035	6,402	1,429	...	451	806
18-20 years	18,404	8,801	27,742	10,028	2,374	423	551	853
21-24 years	34,564	18,256	32,154	15,542	2,179	...	339	1,543
25-29 years	49,153	25,037	28,645	18,340	1,357	404	157	1,246
30-34 years	55,142	22,474	24,716	14,484	611	308	133	1,670
35-44 years	127,662	44,864	40,639	24,405	513	326	201	1,724
45-54 years	73,807	34,383	19,389	11,663	...	...	...	895
55-64 years	10,790	5,933	2,311	1,430	...	...	...	...
65 years and older	1,503	653	403	49	...	...	...	...
Unknown	518	188	136	35	...	...	...	...
Race/ethnicity								
White	145,216	68,297	111,685	60,469	4,108	...	1,326	4,734
Black	152,732	41,831	53,955	4,323	2,140	37	268	2,133
Hispanic	36,888	18,595	18,677	8,904	...	50	104	861
Race/ethnicity NTA	4,589	1,607	2,706	1,910	191	...	...	34
Unknown	43,925	31,807	28,642	27,238	1,370	291	233	1,165

Table 6 (continued)

Illicit drugs, by patient characteristics: 2004

Patient characteristics	Selected drugs[1]							
	Cocaine	Heroin	Marijuana	Stimulants	MDMA (Ecstasy)	GHB	LSD	PCP
	ED visits per 100,000 population[2,3,4]							
Total drug-related ED visits	**131**	**55**	**73**	**35**	**3**	**1**	**1**	**3**
Gender								
Male	173	75	98	41	3	1	1	4
Female	89	36	49	...	...	...	0	...
Age								
0-5 years	1	...	...	...	...	...	...	...
6-11 years	...	...	2	...	...	...	...	...
12-17 years	45	6	154	25	6	...	2	3
18-20 years	149	71	225	81	19	3	4	7
21-24 years	205	108	190	92	13	...	2	9
25-29 years	251	128	146	94	7	2	1	6
30-34 years	269	110	121	71	3	2	1	8
35-44 years	289	102	92	55	1	1	0	4
45-54 years	177	83	47	28	...	...	...	2
55-64 years	37	20	8	5	...	...	...	...
65 years and older	4	2	1	0	...	...	...	...

[1] This classification of drugs is derived from the Multum *Lexicon,* Copyright 2005, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2005). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

[2] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

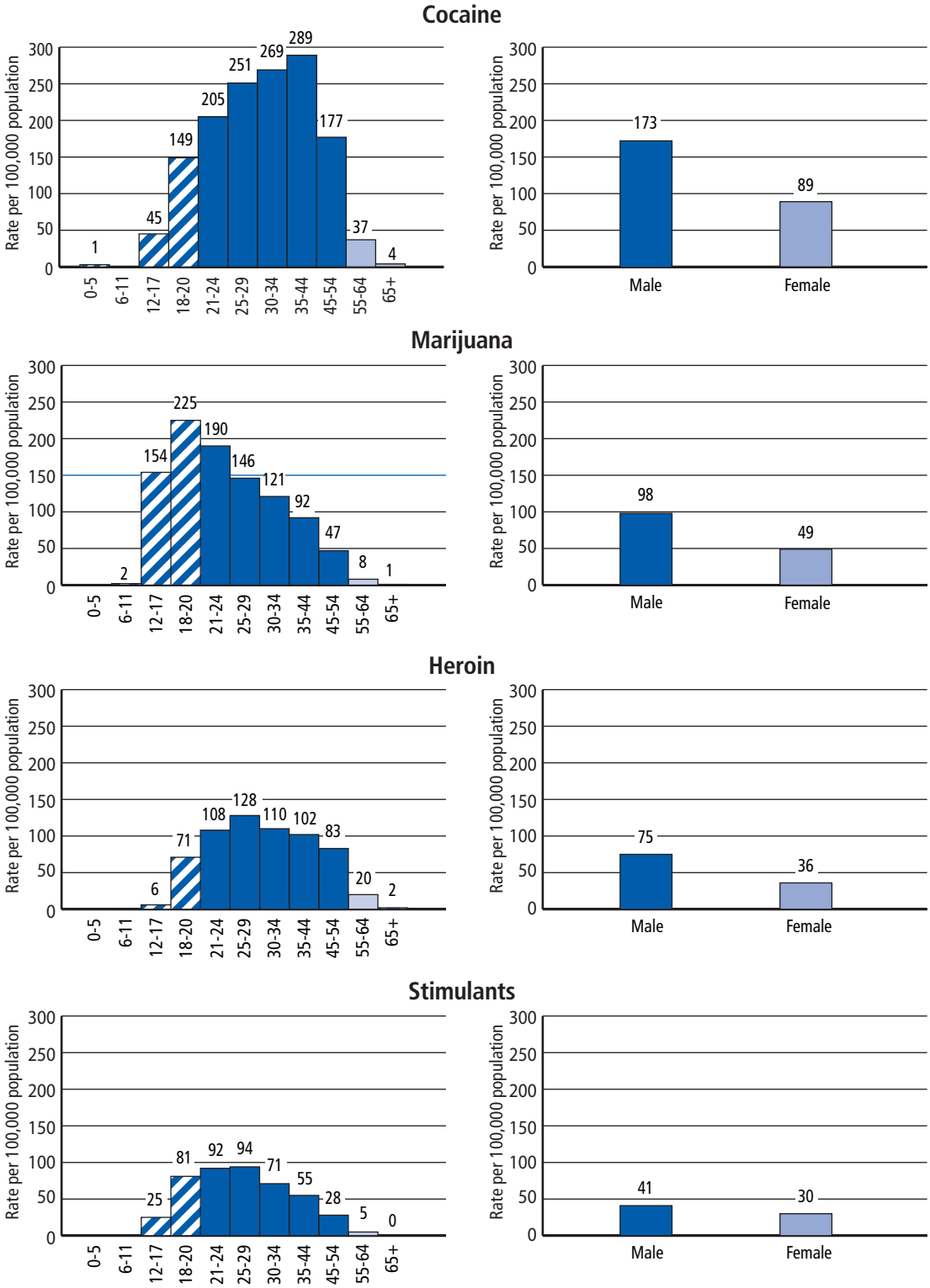
[3] Estimates are all expressed in visits.

[4] Three dots (…) indicate that an estimate with an RSE greater than 50% or an estimate less than 30 has been suppressed.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Figure 5

Illicit drugs, ED visit rates by age and gender: 2004



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

ALCOHOL AND DRUG-RELATED ED VISITS

The second method of assessing drug misuse and abuse in DAWN focuses on alcohol:

- Alcohol used in combination with other drugs, and
- Alcohol alone, in patients under the age of 21.

For 2004, DAWN estimates 461,809 (CI: 375,820 to 547,798) drug-related ED visits involved alcohol in combination with another drug or alcohol alone in a patient under the age of 21. Thus, nearly a quarter (23%) of all drug-related ED visits involved alcohol in one of these forms (Table 7).

Table 7

Alcohol in drug-related ED visits: 2004

Drug category and selected drugs[1]	Estimated visits[2,3]	Relative standard error (RSE)	95% Confidence interval		
			Lower bound	-	Upper bound
Total drug-related ED visits	**1,997,993**	**7.4**	**1,708,205**	**-**	**2,287,781**
Alcohol	461,809	9.5	375,820	-	547,798
Alcohol-in-combination	363,641	10.4	289,516	-	437,766
Alcohol alone	98,168	10.9	77,196	-	119,140

[1] This classification of drugs is derived from the Multum *Lexicon,* Copyright 2005, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2005). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

[2] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

[3] Estimates are all expressed in visits.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Alcohol in combination with other drugs (Tables 8-10, Figure 6)

DAWN estimates 363,641 (CI: 289,516 to 437,766) ED visits related to use of alcohol in combination with another drug in 2004. Alcohol is reported to DAWN in combination with other drugs, regardless of the patient's age. These are the only alcohol reports received for patients aged 21 and older. Nearly 9 out of 10 (87%) ED visits implicating alcohol with another drug were for adult patients. Alcohol in combination appeared in substantial numbers in most case types (Table 8):

- In 30% of ED visits related to suicide attempts,
- In 34% of seeking detox visits,
- In 20% of overmedication visits,
- In 49% of malicious poisoning visits, and
- In 30% of visits categorized as case type *other*.

Alcohol was involved with other drugs in about a quarter (27%) of ED visits involving misuse or abuse of drugs—i.e., overmedication, malicious poisoning, and case type other, considered as a group. Alcohol appeared rarely in adverse reactions (1% of visits).

Table 8
Alcohol, by type of case: 2004

Drug category and selected drugs[1]	All case types	Type of case							
		Suicide attempt	Seeking detox	Alcohol only (age < 21)	Adverse reaction	Over-medication	Malicious poisoning	Accidental ingestion	Other
Drug-related ED visits[2,3,4]									
Total drug-related ED visits	**1,997,993**	**121,585**	**177,879**	**96,809**	**592,044**	**244,330**	**6,026**	**57,940**	**701,381**
Alcohol	461,809	37,414	60,022	96,809	8,212	47,915	2,935	603	207,897
Alcohol-in-combination	363,641	36,702	59,599		8,200	47,915	2,935	601	207,689
Alcohol alone	98,168	712	424	96,809	...	...	...	...	...
Percent of visits									
Alcohol	23%	31%	34%	100%	1%	20%	49%	1%	30%
Alcohol-in-combination	18%	30%	34%		1%	20%	49%	1%	30%
Alcohol alone	5%	1%	0%	100%	...	...	...	...	...

[1] This classification of drugs is derived from the Multum *Lexicon,* Copyright 2005, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2005). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

[2] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

[3] Estimates are all expressed in visits.

[4] Three dots (…) indicate that an estimate with an RSE greater than 50% or an estimate less than 30 has been suppressed.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Alcohol was most frequently combined with (Table 9):

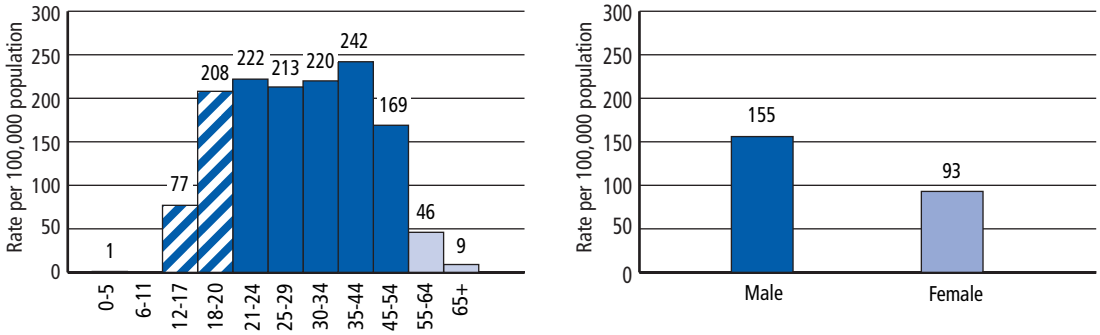
- Cocaine alone (83,816 visits),
- Marijuana alone (33,954 visits),
- Cocaine and marijuana (19,697 visits), and
- Heroin alone (14,669 visits).

Among cases involving misuse or abuse of drugs, DAWN estimates 258,539 (CI: 189,623 to 327,455) ED visits involving alcohol in combination with other drugs in 2004. Males accounted for 62% of these visits involving alcohol and other drugs, but taking population size into account, males and females had similar rates of such visits. There was little variation in rates across the age groups from ages 18 to 44. However, rates of such visits were lower for older and younger patients.

In terms of race and ethnicity, 51% of the visits with alcohol in combination involved patients who were white. Evaluating the relative frequencies of the other race/ethnicity groups is impeded by missing data; in 14% of visits race/ethnicity was unknown.

Figure 6

Alcohol with other drugs, ED visit rates by age and gender: 2004



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Table 9

Drugs reported most frequently with alcohol, by type of case: 2004

Drugs reported with alcohol[1]	All case types	Type of case							
		Suicide attempt	Seeking detox	Alcohol only (age < 21)	Adverse reaction	Over-medication	Malicious poisoning	Accidental ingestion	Other
Drug-related ED visits[2,3,4]									
No other drug	98,168	712	424	96,809	...	...	...	...	...
Cocaine only	83,816	1,566	20,234		...	...	324	...	61,686
Marijuana only	33,963	506	2,333		...	...	...	...	31,099
Cocaine and marijuana only	19,697	437	4,973		...	...	94	...	14,193
Heroin only	14,669	349	4,565		...	...	...	...	9,751
Cocaine and heroin only	9,992	167	4,181		...	...	...	...	5,641
Stimulants only	9,525	204	949		...	...	87	...	8,269
Alprazolam only	9,035	1,371	717		253	4,097	...	...	2,590

[1] This classification of drugs is derived from the Multum *Lexicon,* Copyright 2005, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2005). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

[2] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

[3] Estimates are all expressed in visits.

[4] Three dots (…) indicate that an estimate with an RSE greater than 50% or an estimate less than 30 has been suppressed.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Table 10

Alcohol, by patient characteristics: 2004

Patient characteristics	All case types[1,2,3,4]			Overmedication, malicious poisoning, and case type *other*[1,2,3,4]
	All alcohol	Alcohol-in-combination	Alcohol alone	Alcohol-in-combination
Total drug-related ED visits	**461,809**	**363,641**	**98,168**	**258,539**
Gender				
Male	281,019	224,217	56,802	161,412
Female	180,675	139,322	41,353	97,037
Unknown	114	102	...	90
Age				
0-5 years	701	335	366	...
6-11 years	283	...	267	...
12-17 years	60,118	19,605	40,512	16,835
18-20 years	82,583	25,676	56,907	21,004
21-24 years	37,437	37,436	...	28,070
25-29 years	41,592	41,584	...	29,309
30-34 years	44,946	44,935	...	29,931
35-44 years	106,723	106,720	...	74,182
45-54 years	70,440	70,362	...	47,537
55-64 years	13,319	13,314	...	9,006
65 years and older	3,298	3,289	...	2,186
Unknown	369	369	...	284
Race/ethnicity				
White	250,706	191,860	58,846	130,865
Black	94,014	86,541	7,473	63,102
Hispanic	44,747	32,773	11,974	24,509
Race/ethnicity NTA	6,727	4,570	2,157	3,613
Unknown	65,614	47,896	17,718	36,451

[1] This classification of drugs is derived from the Multum *Lexicon,* Copyright 2005, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2005). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

[2] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

[3] Estimates are all expressed in visits.

[4] Three dots (…) indicate that an estimate with an RSE greater than 50% or an estimate less than 30 has been suppressed.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Alcohol only in patients under the age of 21 (Table 11, Figure 7)

DAWN estimates 96,809 (CI: 76,127 to 117,491) ED visits related to use of alcohol by patients who were younger than age 21 in 2004 (Table 4). These numbers increase very little if instances of underage alcohol use in suicide attempts and seeking detox cases are also included (Table 11).

Alcohol was specifically indicated in a diagnosis in about two out of three (68%) alcohol-only visits, with toxic effects (e.g., "intoxication") in slightly fewer (57%) visits. Injuries were diagnosed in 29% of alcohol-only visits, and accidents, involving falls or motor vehicles, were indicated by diagnosis in 7% (Table 11).

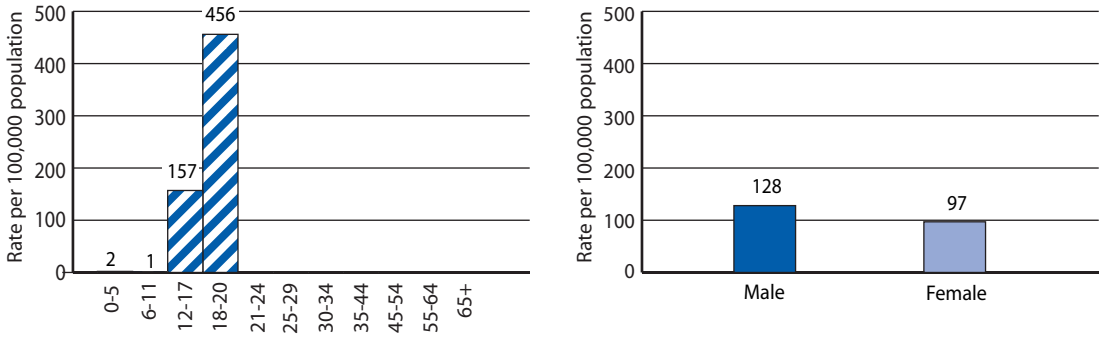
Most (85%) of such visits resulted in patients being treated and released, usually to home; another 9% were admitted to inpatient units.

Taking population size into account, the rate of alcohol-only ED visits for ages 18 to 20 (456 visits per 100,000 population) was 2.9 times that for patients aged 12 to 17 (157 per 100,000). The rates for males and females were equivalent.

In terms of race and ethnicity, 60% of the alcohol-only visits involved patients who were white. Evaluating the relative frequencies of the other race/ethnicity groups is impeded by missing data; in 18% of visits race/ethnicity was unknown.

Figure 7

Alcohol only (age < 21), ED visit rates by age and gender: 2004



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Table 11

Alcohol only (age < 21), by patient and visit characteristics: 2004

Patient characteristics	Estimated visits[1,2]
Total drug-related ED visits	**96,809**
Gender	
Male	56,223
Female	40,573
Unknown	...
Age	
0-5 years	366
6-11 years	267
12-17 years	39,809
18-20 years	56,367
21-24 years	
25-29 years	
30-34 years	
35-44 years	
45-54 years	
55-64 years	
65 years and older	
Unknown	
Race/ethnicity	
White	58,010
Black	7,314
Hispanic	11,757
Race/ethnicity NTA	2,147
Unknown	17,581

Visit characteristics	Estimated visits[1,2]
Number of drugs involved	
Single drug	96,809
Multiple drugs	
Alcohol involved	96,809
Disposition	
Treated and released	82,486
Discharged home	71,324
Released to police/jail	9,058
Referred to detox/treatment	2,103
Admitted to this hospital	9,025
ICU/critical care	3,614
Surgery	247
Chemical dependency/detox	...
Psychiatric unit	800
Other inpatient unit	4,106
Other disposition	5,298
Transferred	3,347
Left against medical advice	1,023
Died	...
Other	317
Not documented	519
Selected diagnoses[3]	
Drug-related diagnoses	
Abuse	6,789
Alcohol	65,742
Toxic effects	55,412
Other conditions	
Altered mental status	7,635
Injuries	27,689
Psychiatric conditions	6,430
Depression	3,353
Suicide (other than attempt)	2,248
Miscellaneous	
Accidents	6,736
Fall	907
Motor vehicle	5,786

[1] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

[2] Three dots (…) indicate that an estimate with an RSE greater than 50% or an estimate less than 30 has been suppressed.

[3] Components do not sum to total because multiple diagnoses may be reported for a single visit.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Any alcohol in patients under the age of 21 (Table 12)

Alcohol use by minors also occurs in combination with other drugs. Considering alcohol only and alcohol in combination with other drugs, DAWN estimates:

- 60,118 (CI: 44,918 to 75,318) drug-related ED visits for patients aged 12-17, and
- 82,583 (CI: 67,853 to 97,313) drug-related ED visits for patients aged 18-20.

Table 12

Alcohol in drug-related ED visits in patients under age 21: 2004

Drug category and selected drugs[1]	Estimated visits[2,3]	Relative standard error (RSE)	95% Confidence interval		
			Lower bound	-	Upper bound
Patients aged 12-17					
Alcohol	60,118	12.9	44,918	-	75,318
Alcohol-in-combination	19,605	14.1	14,187	-	25,023
Alcohol alone	40,512	13.5	29,793	-	51,231
Patients aged 18-20					
Alcohol	82,583	9.1	67,853	-	97,313
Alcohol-in-combination	25,676	7.3	22,002	-	29,350
Alcohol alone	56,907	11.1	44,526	-	69,288

[1] This classification of drugs is derived from the Multum *Lexicon,* Copyright 2005, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2005). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

[2] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

[3] Estimates are all expressed in visits.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

NON-MEDICAL USE OF PHARMACEUTICALS AND DRUG-RELATED ED VISITS

The third method for assessing drug misuse and abuse in DAWN focuses on the non-medical use of prescription and over-the-counter (OTC) pharmaceuticals. For this assessment, we consider drug-related ED visits related to three case types: overmedication, malicious poisoning, and case type *other*. Overmedication is defined as a patient taking more than the prescribed or recommended dose of a prescription or OTC pharmaceutical, and illicit drugs are explicitly excluded. Malicious poisoning means the patient was deliberately poisoned or drugged by another person. These cases may include drug-facilitated assault, drug-facilitated sexual assault, homicide when the weapon was a drug, and product tampering. Visits classified as case type *other* include pharmaceuticals taken, in general, for non-medical purposes that do not meet the criteria for any other DAWN case types, including pharmaceuticals taken in combination with illicit drugs. DAWN tries to capture only drugs related to the ED visit and actively discourages reporting of current medications that are unrelated. It is important to understand, however, that it is not possible to eliminate completely the reporting of current medications from the drugs being misused, and this should be considered in interpreting these findings.

Non-medical use of pharmaceuticals (Tables 13-14, Figure 8)

For 2004, DAWN estimates 495,732 (CI: 408,285 to 583,179) ED visits involved non-medical use—i.e., misuse or abuse—of prescription or OTC pharmaceuticals or dietary supplements (Table 13). Multiple drugs were involved in more than half (57%) of these ED visits (Table 14):

- Over one-fifth (23%) involved alcohol in combination with another drug.
- About 14% involved an illicit drug (other than alcohol).
- About 6% involved alcohol and an illicit drug.

Central nervous system (CNS) agents (53% of visits involving non-medical use) and psychotherapeutic agents (48%) were the most frequent drugs in these visits (Table 13). Respiratory agents (4%), cardiovascular agents (6%), and all other categories of pharmaceuticals were much less frequent.

Among the CNS agents, the most frequent drugs were opiate/opioid analgesics (32% of non-medical use visits), including single-ingredient (e.g., oxycodone) and combination forms (e.g., hydrocodone with acetaminophen). Methadone and single-ingredient and combination forms of oxycodone and hydrocodone were the most frequent opioids. Once the margin of error is taken into account, these three opioids appear in similar numbers of visits:

- Methadone in 31,874 ED visits (CI: 23,752 to 39,996),
- Oxycodone/combinations in 36,559 ED visits (CI: 28,964 to 44,154),
- Hydrocodone/combinations in 42,491 ED visits (CI: 31,831 to 53,151).

It is not possible to know the extent to which the source of these drugs is a legitimate prescription versus other sources. For example, it is not possible to distinguish methadone used for treatment of opiate addiction from the methadone in pill form that is prescribed for pain.

The opioids were followed in frequency by the non-opioid analgesics containing acetaminophen (8% of visits), muscle relaxants (6%), and anticonvulsants (5%). DAWN estimates 37,512 (CI: 29,057 to 45,967) ED visits involving non-opioid acetaminophen products. The most frequent muscle relaxant in ED visits was carisoprodol, which was involved in 17,366 (CI: 11,170 to 23,562) or 4% of ED visits in 2004.

Among the psychotherapeutic agents, the anxiolytics (anti-anxiety agents), sedatives, and hypnotics are the most frequent, occurring in more than a third (35%) of visits associated with pharmaceutical misuse/abuse. This category of pharmaceuticals includes barbiturates, benzodiazepines, and CNS stimulants such as methylphenidate. ED visits involving benzodiazepines clearly outnumber those involving any of the other types of psychotherapeutic agents. DAWN estimates that 144,385 (CI: 115,520 to 173,250) ED visits associated with pharmaceutical misuse/abuse involved benzodiazepines in 2004. This is comparable to the number for opiates/opioids.

According to DAWN, alprazolam in 49,842 visits (CI: 31,085 to 68,599) and clonazepam in 26,238 visits (CI: 20,581 to 31,895) are the most frequent benzodiazepines in ED visits related to pharmaceutical misuse/abuse. Benzodiazepines without a specific ingredient named appear in comparable numbers: 37,081 ED visits (CI: 26,470 to 47,692). Benzodiazepines occurring less frequently but still in substantial numbers include diazepam in 15,733 ED visits (CI: 12,064 to 19,402) and lorazepam in 16,926 ED visits (CI: 14,139 to 19,713).

Among the other anxiolytics, sedatives, and hypnotics, the following drugs appear in similar numbers of ED visits:

- Barbiturates, which are primarily unnamed, in 11,064 ED visits (CI: 7,509 to 14,619),
- Diphenhydramine[8] in 9,330 ED visits (CI: 7,392 to 11,268), and
- Zolpidem in 11,362 ED visits (CI: 8,890 to 13,834).

For the ED visits associated with pharmaceutical misuse/abuse, other psychotherapeutic agents of particular interest include:

- Antidepressants in 62,743 ED visits (CI: 51,551 to 73,935) and
- Antipsychotics, such as quetiapine, in 30,846 ED visits (CI: 22,865 to 38,827).

Methylphenidate, a CNS stimulant that has recently captured much attention, occurs much less frequently. DAWN estimates 1,541 ED visits (CI: 1,027 to 2,055) associated with pharmaceutical misuse/abuse involved methylphenidate.

[8] This includes only single-ingredient formulations. Many multi-ingredient pharmaceuticals containing diphenhydramine are classified elsewhere, e.g., as respiratory agents.

Table 13

Non-medical use of pharmaceuticals: 2004

Selected drug categories and selected drugs[1]	Estimated visits[2,3,4]	Relative standard error (RSE)	95% Confidence interval		
			Lower bound	-	Upper bound
Total drug-related ED visits	**495,732**	**9.0**	**408,285**	**-**	**583,179**
PSYCHOTHERAPEUTIC AGENTS	239,829	9.2	196,584	-	283,074
Antidepressants	62,743	9.1	51,551	-	73,935
MAO inhibitors	...	86.5	...	-	...
SSRI antidepressants	30,817	12.5	23,267	-	38,367
Tricyclic antidepressants	10,897	11.0	8,547	-	13,247
Miscellaneous antidepressants	25,218	9.2	20,671	-	29,765
Antipsychotics	30,846	13.2	22,865	-	38,827
Anxiolytics, sedatives, and hypnotics	175,115	9.4	142,851	-	207,379
Barbiturates	11,064	16.4	7,509	-	14,619
Benzodiazepines	144,385	10.2	115,520	-	173,250
Alprazolam	49,842	19.2	31,085	-	68,599
Clonazepam	26,238	11.0	20,581	-	31,895
Diazepam	15,733	11.9	12,064	-	19,402
Lorazepam	16,926	8.4	14,139	-	19,713
Benzodiazepines-NOS	37,081	14.6	26,470	-	47,692
Misc. anxiolytics, sedatives, and hypnotics	28,304	8.6	23,533	-	33,075
Diphenhydramine	9,330	10.6	7,392	-	11,268
Hydroxyzine	2,468	18.2	1,588	-	3,348
Zolpidem	11,362	11.1	8,890	-	13,834
Anxiolytics, sedatives and hypnotics-NOS	2,722	26.5	1,309	-	4,135
CNS stimulants	7,972	8.6	6,627	-	9,317
Amphetamine-dextroamphetamine	2,227	16.5	1,508	-	2,946
Caffeine	2,787	14.3	2,005	-	3,569
Dextroamphetamine	408	45.1	47	-	769
Methylphenidate	1,541	17.0	1,027	-	2,055
CENTRAL NERVOUS SYSTEM AGENTS	261,582	8.7	216,976	-	306,188
Analgesics	222,833	8.1	187,457	-	258,209
Antimigraine agents	467	23.1	255	-	679
Cox-2 inhibitors	2,641	18.8	1,667	-	3,615
Opiates/opioids	158,281	8.7	131,292	-	185,270
Opiates/opioids, unspecified	29,461	12.4	22,301	-	36,621
Narcotic analgesics	132,207	9.8	106,813	-	157,601
Buprenorphine/combinations	236	35.9	69	-	403
Codeine/combinations	5,836	11.1	4,566	-	7,106
Fentanyl/combinations	8,000	15.0	5,648	-	10,352
Hydrocodone/combinations	42,491	12.8	31,831	-	53,151
Hydromorphone/combinations	2,779	26.1	1,358	-	4,200
Meperidine/combinations	1,310	22.3	738	-	1,882

Table 13 (continued)

Non-medical use of pharmaceuticals: 2004

Selected drug categories and selected drugs[1]	Estimated visits[2,3,4]	Relative standard error (RSE)	95% Confidence interval		
			Lower bound	-	Upper bound
Methadone	31,874	13.0	23,752	-	39,996
Morphine/combinations	12,558	18.2	8,077	-	17,039
Oxycodone/combinations	36,559	10.6	28,964	-	44,154
Propoxyphene/combinations	6,448	16.3	4,388	-	8,508
Non-steroidal anti-inflammatory agents	22,961	9.7	18,596	-	27,326
Ibuprofen	17,934	9.4	14,629	-	21,239
Naproxen	4,817	16.3	3,278	-	6,356
Salicylates/combinations	11,820	16.1	8,090	-	15,550
Miscellaneous analgesics/combinations	41,508	10.6	32,884	-	50,132
Acetaminophen/combinations	37,512	11.5	29,057	-	45,967
Tramadol	2,984	14.7	2,124	-	3,844
Analgesic combinations NTA	1,195	19.4	740	-	1,650
Anorexiants	1,336	20.3	805	-	1,867
Anticonvulsants	26,926	11.2	21,015	-	32,837
Antiemetic/antivertigo agents	1,457	24.0	771	-	2,143
Antiparkinson agents	1,615	18.0	1,045	-	2,185
General anesthetics	...	98.8	...	-	...
Muscle relaxants	28,338	15.2	19,896	-	36,780
Carisoprodol	17,366	18.2	11,170	-	23,562
Cyclobenzaprine	5,932	14.4	4,258	-	7,606
Miscellaneous CNS agents	854	28.6	376	-	1,332
RESPIRATORY AGENTS	20,340	11.1	15,914	-	24,766
Antihistamines	5,148	19.4	3,190	-	7,106
Bronchodilators	2,351	34.0	785	-	3,917
Decongestants	1,468	20.4	882	-	2,054
Expectorants	1,258	23.7	674	-	1,842
Upper respiratory combinations	9,431	8.9	7,787	-	11,075
Respiratory agents NTA	1,979	16.1	1,354	-	2,604
CARDIOVASCULAR AGENTS	27,286	17.2	18,088	-	36,484
Antiadrenergic agents, centrally acting	3,752	25.2	1,898	-	5,606
Beta-adrenergic blocking agents	7,014	14.8	4,980	-	9,048
Calcium channel blocking agents	2,465	22.8	1,363	-	3,567
Diuretics	3,968	30.4	1,604	-	6,332
Cardiovascular agents NTA	14,886	15.6	10,335	-	19,437

[1] This classification of drugs is derived from the Multum *Lexicon,* Copyright 2005, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2005). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

[2] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

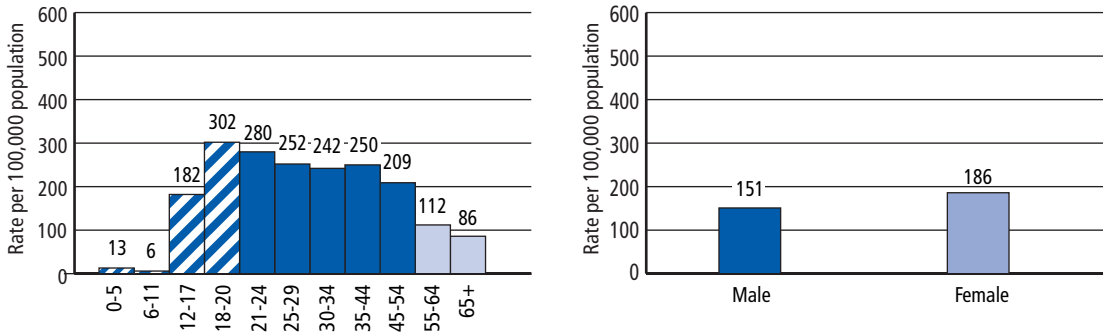
[3] Estimates are all expressed in visits. Visits cannot be summed across drugs because drug-related ED visits often involve multiple drugs.

[4] Three dots (…) indicate that an estimate with an RSE greater than 50% or an estimate less than 30 has been suppressed.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Figure 8

Non-medical use of pharmaceuticals, ED visit rates by age and gender: 2004



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Taking population size and the margin of error into account, visits for non-medical use of pharmaceuticals did not differ between females (186 visits per 100,000 population) and males (151 per 100,000 population) (Figure 8). In terms of age, visit rates were highest for patients aged 18 to 44. Visit rates were lowest for patients 11 and younger. In terms of race and ethnicity, 65% of visits involved patients who were white. Evaluating the relative frequencies of the other race/ethnicity groups is impeded by missing data; in 15% of visits race/ethnicity was unknown.

Patients were treated and released in about half (52%) of ED visits associated with non-medical use of pharmaceuticals, but a third (34%) resulted in admission to inpatient hospital units (Table 14). Of those admitted to the hospital, about a third (36%) were sent to a critical care unit, and about 16% of those admitted to inpatient units went to a psychiatric unit. About 9% of ED visits for non-medical use of pharmaceuticals were transferred to another health care facility.

Among the most frequently occurring diagnoses for pharmaceutical misuse were overdose (in 38% of visits), depression or another psychiatric condition (23%), and suicide other than an attempt (11%). Diagnoses classified as other suicide include suicidal gestures, thoughts, or ideation; suicide attempts were classified separately. Visits frequently had diagnoses indicating drug involvement (70%). About 9% of ED visits involving the non-medical use of pharmaceuticals involved a diagnosis of pain.

Table 14

Non-medical use of pharmaceuticals, by patient and visit characteristics: 2004

Patient characteristics	Estimated visits[1,2]
Total drug-related ED visits	**495,859**
Gender	
Male	218,326
Female	277,273
Unknown	...
Age	
0-5 years	3,076
6-11 years	1,457
12-17 years	46,281
18-20 years	37,294
21-24 years	47,210
25-29 years	49,411
30-34 years	49,461
35-44 years	109,938
45-54 years	87,118
55-64 years	32,556
65 years and older	31,203
Unknown	185
Race/ethnicity	
White	322,515
Black	58,105
Hispanic	36,318
Race/ethnicity NTA	5,315
Unknown	73,013

Visit characteristics	Estimated visits[1,2]
Number of drugs involved	
Single drug	213,241
Multiple drugs	282,618
Alcohol involved	113,136
Disposition	
Treated and released	260,169
Discharged home	228,902
Released to police/jail	10,175
Referred to detox/treatment	21,014
Admitted to this hospital	168,899
ICU/critical care	60,963
Surgery	741
Chemical dependency/detox	...
Psychiatric unit	27,069
Other inpatient unit	75,885
Other disposition	66,793
Transferred	42,861
Left against medical advice	9,297
Died	1,434
Other	3,533
Not documented	...
Selected diagnoses[3]	
Drug-related diagnoses	324,739
Abuse	80,283
Drug or alcohol	360,339
Alcohol	43,950
Drug	345,588
Overdose	190,703
Overmedication	9,744
Toxic effects	50,256
Body system (includes infections)	101,997
Other conditions	
Altered mental status	47,406
Pain	43,499
Psychiatric conditions	115,383
Depression	75,634
Suicide (other than attempt)	54,983

[1] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

[2] Three dots (…) indicate that an estimate with an RSE greater than 50% or an estimate less than 30 has been suppressed.

[3] Components do not sum to total because multiple complaints or multiple diagnoses may be reported for a single visit.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

SPECIAL TYPES OF DRUG-RELATED ED VISITS

This chapter profiles two special types of drug-related ED visits captured by DAWN. Drug-related suicide attempts and seeking detox cases are considered as separate and distinct classes of drug misuse or abuse.

Suicide attempt (Tables 15-16, Figure 9)

DAWN estimates 121,585 (CI: 108,955 to 134,215) ED visits for drug-related suicide attempts in 2004 (Table 15). It is important to remember that DAWN includes only those suicide attempts that involve drugs, but these attempts are not limited to overdoses. Also included are persons who attempt suicide by other means (e.g., by gun) when drugs are involved. Excluded are suicide attempts not involving drugs (e.g., by gun alone) and those documented as something other than an attempt (e.g., suicide ideation, gesture, thought, and so forth).

Nearly two-thirds of ED visits for drug-related suicide attempts involved multiple drugs (64%) (Table 16). Alcohol was the most frequently implicated drug and was involved in nearly a third (31%) of the ED visits for drug-related suicide attempts. Since DAWN excludes visits for adults when alcohol is the only drug, the role of alcohol in suicide attempts is probably larger. The most frequent illicit drugs were cocaine (11% of visits) and marijuana (8% of visits), but the margins of error for the illicit drugs are quite large and the numbers are relatively small when compared with the pharmaceuticals.

More than half (56%) of ED visits for drug-related suicide attempts involved psychotherapeutic agents, and nearly half (47%) involved CNS agents. The most commonly used psychotherapeutic agents were benzodiazepines (26%) and antidepressants (22%), which were implicated in similar numbers of ED visits. Again, it is not possible to know the extent to which these pharmaceuticals may have been prescribed to the patient for a preexisting condition. The CNS agents were primarily analgesics (pain relievers), including both prescription and over-the-counter formulations. DAWN estimates that the most commonly used pain relievers were acetaminophen/combinations and opiates/opioids, with each present in more than a third of visits (39% and 37%, respectively), followed by non-steroidal anti-inflammatory agents (NSAIDS, such as ibuprofen and naproxen, 25%), and salicylates/combinations (aspirins, 11%).

Among the 121,585 ED visits involving suicide, the involvement of alcohol or a drug was indicated by diagnosis in 65% of visits. The other most frequent diagnoses indicated overdose (61%) and suicide attempt (56%). Psychiatric conditions were also implicated in a large proportion of visits (40%), and the psychiatric disorder most frequently present was depression (35%).

About half (54%) of the suicide attempts were admitted for inpatient hospital care, and nearly half of these were admitted to a critical care unit. Others were admitted to psychiatric (14%) or other inpatient units (15%). Another 26% were transferred to another health care facility; only 12% were discharged home. Very few (0.25%) died in the ED. However, DAWN does not account for patients who die before arriving at the ED or patients who die after admission to inpatient units of the hospital.

Table 15

Suicide attempt: 2004

Drug category and selected drugs[1]	Estimated visits[2,3,4]	Relative standard error (RSE)	95% Confidence interval		
			Lower bound	-	Upper bound
Total drug-related ED visits	**121,585**	**5.3**	**108,955**	**-**	**134,215**
Major substances of abuse					
Alcohol	37,414	7.2	32,134	-	42,694
Alcohol-in-combination	36,702	7.2	31,522	-	41,882
Alcohol alone	712	27.4	330	-	1,094
Cocaine	13,940	12.0	10,661	-	17,219
Heroin	2,986	21.0	1,757	-	4,215
Marijuana	9,747	12.6	7,340	-	12,154
Stimulants	4,218	21.0	2,481	-	5,955
Amphetamines	1,894	22.4	1,063	-	2,725
Methamphetamine	2,391	25.8	1,182	-	3,600
MDMA (Ecstasy)	278	36.2	80	-	476
GHB	...	89.4	...	-	...
Flunitrazepam (Rohypnol)	...	92.9	...	-	...
Ketamine	...	43.7	...	-	...
LSD	...	59.5	...	-	...
PCP	418	26.1	204	-	632
Miscellaneous hallucinogens	...	91.9	...	-	...
Inhalants	187	38.4	46	-	328
Combinations NTA	...	58.8	...	-	...
Other substances					
PSYCHOTHERAPEUTIC AGENTS	68,238	5.6	60,749	-	75,727
Antidepressants	26,787	6.7	23,269	-	30,305
MAO inhibitors	...	0.0	...	-	...
SSRI antidepressants	13,968	7.7	11,859	-	16,077
Tricyclic antidepressants	2,561	15.3	1,793	-	3,329
Miscellaneous antidepressants	12,150	7.9	10,268	-	14,032
Antipsychotics	12,830	9.3	10,492	-	15,168
Anxiolytics, sedatives, and hypnotics	42,967	6.5	37,493	-	48,441
Barbiturates	1,004	19.7	616	-	1,392
Benzodiazepines	31,695	8.0	26,724	-	36,666
Alprazolam	11,451	12.6	8,623	-	14,279
Clonazepam	8,370	11.2	6,533	-	10,207
Diazepam	3,571	14.4	2,564	-	4,578
Lorazepam	4,973	13.3	3,677	-	6,269
Benzodiazepines-NOS	3,619	19.4	2,243	-	4,995

Table 15 (continued)
Suicide attempt: 2004

Drug category and selected drugs[1]	Estimated visits[2,3,4]	Relative standard error (RSE)	95% Confidence interval		
			Lower bound	-	Upper bound
Misc. anxiolytics, sedatives, and hypnotics	12,988	8.1	10,926	-	15,050
Diphenhydramine	4,718	13.8	3,442	-	5,994
Hydroxyzine	1,672	15.2	1,174	-	2,170
Zolpidem	4,408	11.0	3,457	-	5,359
Anxiolytics, sedatives and hypnotics-NOS	1,140	20.1	691	-	1,589
CNS stimulants	1,457	19.5	900	-	2,014
Amphetamine-dextroamphetamine	289	39.5	66	-	512
Caffeine	...	51.8	...	-	...
Dextroamphetamine	...	80.4	...	-	...
Methylphenidate	348	33.5	119	-	577
CENTRAL NERVOUS SYSTEM AGENTS	56,763	6.3	49,754	-	63,772
Analgesics	46,259	6.0	40,818	-	51,700
Antimigraine agents	299	39.3	68	-	530
Cox-2 inhibitors	708	19.7	436	-	980
Opiates/opioids	16,889	7.9	14,274	-	19,504
Opiates/opioids, unspecified	1,874	14.9	1,327	-	2,421
Narcotic analgesics	15,133	8.6	12,583	-	17,683
Buprenorphine/combinations	...	101.8	...	-	...
Codeine/combinations	1,431	16.4	970	-	1,892
Fentanyl/combinations	...	65.3	...	-	...
Hydrocodone/combinations	7,325	11.0	5,745	-	8,905
Hydromorphone/combinations	...	54.1	...	-	...
Meperidine/combinations	...	57.7	...	-	...
Methadone	1,207	28.4	535	-	1,879
Morphine/combinations	683	23.8	364	-	1,002
Oxycodone/combinations	3,324	12.1	2,536	-	4,112
Propoxyphene/combinations	2,088	19.3	1,298	-	2,878
Non-steroidal anti-inflammatory agents	11,594	7.7	9,844	-	13,344
Ibuprofen	8,063	9.1	6,624	-	9,502
Naproxen	3,199	16.0	2,195	-	4,203
Salicylates/combinations	5,068	12.4	3,837	-	6,299
Miscellaneous analgesics/combinations	19,019	7.9	16,073	-	21,965
Acetaminophen/combinations	17,847	8.3	14,944	-	20,750
Tramadol	1,045	27.5	482	-	1,608

Table 15 (continued)

Suicide attempt: 2004

Drug category and selected drugs[1]	Estimated visits[2,3,4]	Relative standard error (RSE)	95% Confidence interval		
			Lower bound	-	Upper bound
Analgesic combinations NTA	428	32.9	152	-	704
Anorexiants	115	33.8	39	-	191
Anticonvulsants	8,643	15.1	6,085	-	11,201
Antiemetic/antivertigo agents	...	54.7	...	-	...
Antiparkinson agents	246	41.5	46	-	446
General anesthetics	...	0.0	...	-	...
Muscle relaxants	5,829	13.5	4,286	-	7,372
Carisoprodol	2,489	19.1	1,558	-	3,420
Cyclobenzaprine	1,996	16.7	1,343	-	2,649
Miscellaneous CNS agents	...	64.9	...	-	...
RESPIRATORY AGENTS	5,879	12.6	4,427	-	7,331
Antihistamines	1,384	26.4	669	-	2,099
Bronchodilators	400	37.9	102	-	698
Decongestants	429	31.2	166	-	692
Expectorants	347	33.7	118	-	576
Upper respiratory combinations	3,098	13.7	2,267	-	3,929
Respiratory agents NTA	625	36.9	172	-	1,078
CARDIOVASCULAR AGENTS	6,258	13.1	4,651	-	7,865
Antiadrenergic agents, centrally acting	592	22.6	329	-	855
Beta-adrenergic blocking agents	2,205	17.6	1,445	-	2,965
Calcium channel blocking agents	766	28.4	339	-	1,193
Diuretics	459	29.3	196	-	722
Cardiovascular agents NTA	3,007	18.1	1,941	-	4,073

[1] This classification of drugs is derived from the Multum *Lexicon,* Copyright 2005, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2005). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

[2] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

[3] Estimates are all expressed in visits. Visits cannot be summed across drugs because drug-related ED visits often involve multiple drugs.

[4] Three dots (…) indicate that an estimate with an RSE greater than 50% or an estimate less than 30 has been suppressed.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Table 16

Suicide attempt, by patient and visit characteristics: 2004

Patient characteristics	Estimated visits[1,2]
Total drug-related ED visits	**121,585**
Gender	
Male	45,091
Female	76,475
Unknown	...
Age	
0-5 years	...
6-11 years	31
12-17 years	15,299
18-20 years	11,145
21-24 years	13,180
25-29 years	14,392
30-34 years	15,685
35-44 years	26,041
45-54 years	19,069
55-64 years	4,663
65 years and older	1,905
Unknown	...
Race/ethnicity	
White	75,019
Black	14,155
Hispanic	13,572
Race/ethnicity NTA	1,519
Unknown	17,319

Visit characteristics	Estimated visits[1,2]
Number of drugs involved	
Single drug	43,425
Multiple drugs	78,160
Alcohol involved	37,414
Disposition	
Treated and released	20,770
Discharged home	14,589
Released to police/jail	1,025
Referred to detox/treatment	5,156
Admitted to this hospital	65,129
ICU/critical care	29,261
Surgery	30
Chemical dependency/detox	...
Psychiatric unit	16,982
Other inpatient unit	18,551
Other disposition	35,687
Transferred	31,822
Left against medical advice	506
Died	308
Other	696
Not documented	...
Selected diagnoses[3]	
Drug-related diagnoses	82,254
Drug or alcohol	79,423
Alcohol	11,897
Drug	76,036
Illicits	5,715
Other or unspecified drug	72,387
Overdose	73,596
Toxic effects	12,995
Other conditions	
Altered mental status	4,347
Psychiatric conditions	48,947
Depression	42,898
Suicide	91,561
Suicide attempt	68,123
Other suicide-related	24,974

[1] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

[2] Three dots (…) indicate that an estimate with an RSE greater than 50% or an estimate less than 30 has been suppressed.

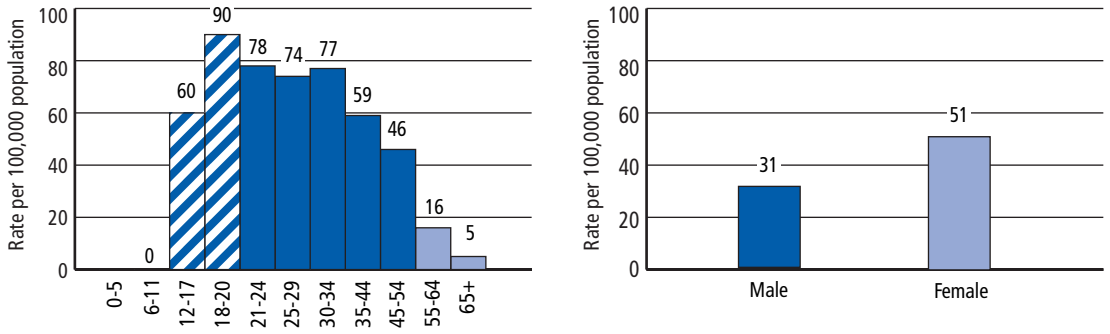
[3] Components do not sum to total because multiple diagnoses may be reported for a single visit.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

After accounting for population size and the margins of error, the rate of suicide visits for females (51 visits per 100,000 population) was higher than that for males (31 per 100,000). The rates for patients aged 18 to 34 exceeded the rates for younger and older age groups. Although the rate for patients aged 12 to 17 (60 visits per 100,000) was lower than that for ages 18 to 34, it exceeded the rate for patients aged 45 and over. Nearly two-thirds (62%) of the suicide attempts involved patients who were white. Evaluating the relative frequencies of the other race/ethnicity groups is impeded by missing data; in 14% of visits race/ethnicity was unknown.

Figure 9

Suicide attempt, ED visit rates by age and gender: 2004



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Seeking detox (Tables 17-18, Figure 10)

DAWN estimates 177,879 (CI: 70,845 to 284,913) drug-related ED visits for patients seeking detoxification or substance abuse treatment services during 2004. These visits tend to be concentrated in hospitals with administrative practices that require medical clearance in the ED for admission to detox or substance abuse treatment units in the hospital. Therefore, it is impossible to know the full extent of the demand for these services from this estimate.

More than 60% of the seeking detox ED visits involved multiple drugs. A third (34%) involved alcohol, but for adults this includes only alcohol in combination with other drugs. Among the other major substances of abuse, cocaine (in 46% of visits) and heroin (30% of visits) occurred most frequently, followed by marijuana (15% of visits) and amphetamine or methamphetamine stimulants (7% of visits). Estimates for most pharmaceuticals are too imprecise for publication.[9]

Drug and/or alcohol involvement was indicated by diagnosis in 9 out of every 10 seeking detox visits. Psychiatric conditions were diagnosed in 23% of the visits. This suggests co-occurring drug misuse/abuse and mental health disorders. Drug abuse was indicated by diagnosis in 57% of the visits.

Among the seeking detox ED visits, 7 out of 10 received some type of follow-up care, either inpatient admission, referral elsewhere for detox or substance abuse treatment services, or transfer to another health care facility. However, about a quarter of seeking detox cases may not have received the care they sought because they were discharged to home.

[9] This is not wholly unexpected since the numbers of seeking detox ED visits can vary dramatically across hospitals, and the presence of specialized detoxification or substance abuse treatment units is not accounted for in the DAWN sample design.

Table 17

Seeking detox: 2004

Drug category and selected drugs[1]	Estimated visits[2,3,4]	Relative standard error (RSE)	95% Confidence interval		
			Lower bound	-	Upper bound
Total drug-related ED visits	**177,879**	**30.7**	**70,845**	**-**	**284,913**
Major substances of abuse					
Alcohol	60,022	26.4	28,964	-	91,080
Alcohol-in-combination	59,599	26.6	28,527	-	90,671
Alcohol alone	424	29.6	177	-	671
Cocaine	81,439	28.6	35,787	-	127,091
Heroin	53,088	19.9	32,381	-	73,795
Marijuana	27,259	22.7	15,131	-	39,387
Stimulants	12,151	33.5	4,172	-	20,130
Amphetamines	1,829	42.0	324	-	3,334
Methamphetamine	10,518	33.8	3,550	-	17,486
MDMA (Ecstasy)	...	50.9	...	-	...
GHB	...	86.5	...	-	...
Flunitrazepam (Rohypnol)	...	0.0	...	-	...
Ketamine	...	15.9	...	-	...
LSD	60	21.6	35	-	85
PCP	410	38.7	98	-	722
Miscellaneous hallucinogens	90	43.0	14	-	166
Inhalants	...	52.7	...	-	...
Combinations NTA	222	41.3	42	-	402

[1] This classification of drugs is derived from the Multum *Lexicon,* Copyright 2005, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2005). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

[2] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

[3] Estimates are all expressed in visits. Visits cannot be summed across drugs because drug-related ED visits often involve multiple drugs.

[4] Three dots (…) indicate that an estimate with an RSE greater than 50% or an estimate less than 30 has been suppressed.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Table 18

Seeking detox, by patient and visit characteristics: 2004

Patient characteristics	Estimated visits[1,2]
Total drug-related ED visits	**177,879**
Gender	
Male	115,316
Female	62,541
Unknown	...
Age	
0-5 years	...
6-11 years	...
12-17 years	3,000
18-20 years	10,036
21-24 years	21,573
25-29 years	28,827
30-34 years	28,335
35-44 years	50,380
45-54 years	30,434
55-64 years	4,566
65 years and older	579
Unknown	...
Race/ethnicity	
White	110,518
Black	41,128
Hispanic	9,641
Race/ethnicity NTA	1,324
Unknown	15,268

Visit characteristics	Estimated visits[1,2]
Number of drugs involved	
Single drug	66,182
Multiple drugs	111,696
Alcohol involved	60,022
Disposition	
Treated and released	89,851
Discharged home	45,459
Released to police/jail	1,174
Referred to detox/treatment	43,217
Admitted to this hospital	71,017
ICU/critical care	450
Surgery	...
Chemical dependency/detox	...
Psychiatric unit	11,514
Other inpatient unit	4,401
Other disposition	17,011
Transferred	10,433
Left against medical advice	2,539
Died	...
Other	1,428
Not documented	2,532
Selected diagnoses[3]	
Drug-related diagnoses	158,636
Abuse	101,454
Addiction	14,056
Dependence	28,052
Detox	15,505
Withdrawal	17,179
Drug or alcohol	161,601
Alcohol	25,475
Drug	157,866
Illicits	47,469
Other or unspecified drug	117,835
Other conditions	
Psychiatric conditions	40,520
Suicide (other than attempt)	11,470

[1] These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the coterminous U.S.

[2] Three dots (…) indicate that an estimate with an RSE greater than 50% has been suppressed.

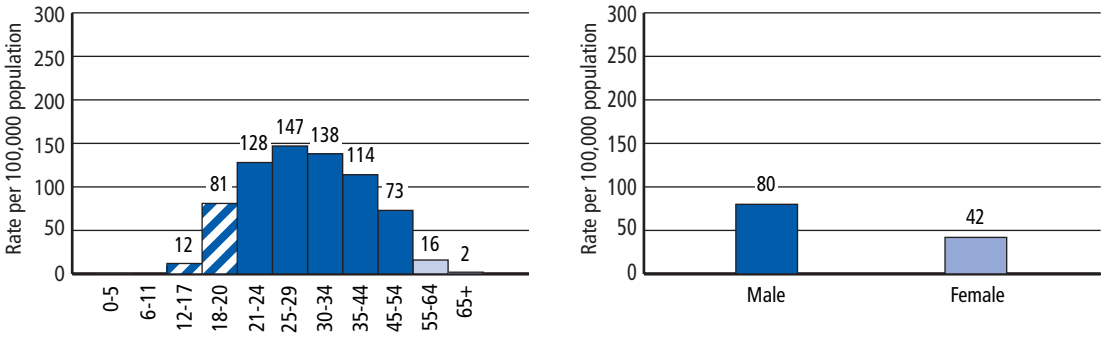
[3] Components do not sum to total because multiple complaints or multiple diagnoses may be reported for a single visit.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2003 (03/2004 update).

Taking population size and the margins of error into account, the rate of seeking detox cases was similar across all age groups in the 18 to 54 range. The rate of seeking detox visits for males was not significantly different than that for females. The lack of significant differences between age and gender subgroups is partially due to large margins of error. The majority (62%) of seeking detox visits involved patients who were white. Evaluating the relative frequencies of the other race/ethnicity groups is impeded by missing data; in 9% of visits race/ethnicity was unknown.

Figure 10

Seeking detox, ED visit rates by age and gender: 2004



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

Appendixes

APPENDIX A

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END-USER LICENSE AGREEMENT

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Cerner Multum, Inc.
Colorado Center Tower One
2000 South Colorado Boulevard
Suite 11000
Denver, Colorado 80222
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APPENDIX B

DAWN METHODOLOGY

Introduction

The Drug Abuse Warning Network (DAWN) is a public health surveillance system that has monitored drug-related emergency department (ED) visits to hospitals since the early 1970s. DAWN was initially established by the Drug Enforcement Administration. Then, DAWN was transferred to the U.S. Department of Health and Human Services (USDHHS), where the National Institute on Drug Abuse conducted DAWN from 1980 to 1992. Since 1992, the Office of Applied Studies (OAS) of the Substance Abuse and Mental Health Services Administration (SAMHSA), USDHHS, has been responsible for DAWN operations and reporting.

Since its inception, DAWN has relied on data collected from a sample of hospitals. However, over the years, the exact survey methodology has been adjusted to improve the quality, reliability, and generalizability of the information produced by DAWN. When the National Institute on Drug Abuse assumed responsibility for DAWN in 1980, implementation of a sample of hospitals to produce representative estimates for the Nation and for selected metropolitan areas became a priority. This sample, refreshed with annual maintenance, continued to support DAWN estimates for the coterminous United States and 21 metropolitan areas until 2002. By that time, major population shifts and changes in the hospital industry over the preceding two decades made apparent the need for a redesign of the sample of hospitals, which was undertaken as part of a wholesale redesign of most major features of DAWN.

Currently, the DAWN survey relies on a longitudinal probability sample of hospitals located throughout the United States, including Alaska and Hawaii. Hospitals eligible for selection into the DAWN sample must be non-Federal, short-stay, general surgical and medical hospitals located in the United States with at least one 24-hour emergency department. This current approach was implemented in the 2004 data collection year, and this publication is the first to include estimates based on this sample design.

Under the current methodological design, medical charts for all ED visits within the selected hospitals are reviewed retrospectively to find the drug-related cases for submission to DAWN. DAWN includes ED visits associated with substance abuse and drug misuse, both intentional and accidental. DAWN also includes ED visits related to the use of drugs for legitimate therapeutic purposes. To be a DAWN case, a drug needs only to be implicated in the visit; the drug does not need to have caused the visit. Only recent drug use is included; the reason a patient used the drug is irrelevant, and the case criteria are broad enough to encompass all types of drug-related events, which include, but are not limited to, explicit drug abuse. This approach, which finds ED visits related to drug abuse only indirectly, recognizes that medical records (the source of DAWN data) frequently lack explicit documentation of substance abuse, and distinctions between use, misuse, and abuse of drugs are often subjective.

DAWN uses the data from the visits classified as DAWN cases in the selected hospitals to calculate various estimates of drug-related visits for the Nation as a whole, as well as for specific metropolitan areas. To calculate these estimates and measure their precision, the DAWN survey requires the application of sampling and weighting methodologies. This appendix documents the sampling, weighting, and variance estimation methodologies used to develop estimates based on data collected in 2004.

Target population

The target population is drug-related emergency department visits in non-Federal, short-stay, general surgical and medical hospitals in the United States with at least one 24-hour emergency department.

Sampling frame

DAWN uses the American Hospital Association (AHA) Annual Survey Database as the basis for its sampling frame. The AHA maintains an updated national registry of U.S. hospitals that is estimated to have a coverage rate of 99%.[1] A health care organization must meet several criteria to be classified as a hospital. These include the provision of patient services, diagnostic or therapeutic, for general or specific medical conditions, licensed medical staff, and accreditation by organizations such as the Joint Commission on Accreditation of Health Care Organizations. A hospital is considered to be eligible for inclusion in the DAWN sampling frame if it is a non-Federal, short-stay, general surgical and medical hospital in the United States with at least one 24-hour emergency department. Many DAWN hospitals operate multiple emergency departments.

Sample maintenance

DAWN is a longitudinal survey that will be used to analyze trends in drug-related ED visits. In order to keep the frame representative of the current population of hospitals, annual sample updates must be performed. The initial sample was selected in 2003 from a sampling frame created from the 2001 AHA Annual Survey Database. In every subsequent year, the sampling frame is updated to reflect new, closed, merged, and demerged hospitals based on updates to the AHA files. These updates include newly eligible hospitals, which are those new hospitals or previously ineligible hospitals that are now eligible. Each year the newly eligible hospitals are provided the opportunity to be selected into the sample based on the sampling fraction of the stratum in which the newly eligible hospital is located.

Determination of DAWN eligibility

A hospital is considered ineligible if any one of the key criteria that define eligibility is not met. Only those hospitals that meet all the criteria are considered eligible. For hospitals where critical eligibility data are missing from the AHA database, if one of the non-missing criteria is not met, the hospital is considered ineligible. Otherwise, the hospital is considered to have unknown eligibility. For any hospital with unknown eligibility, other variables on the AHA Annual Survey Database are used to determine eligibility. If the hospital's eligibility remains unknown after exploration of these additional characteristics, then the hospital may be contacted directly to determine eligibility.

Stratification

DAWN employs a stratified simple random sampling approach to select a representative sample of hospitals for inclusion in the DAWN sample. It is important that DAWN produce reliable estimates for major metropolitan areas as well as the Nation. Therefore, the first level of stratification is based on geography. There are two geographic stratification schemes: one for specified Metropolitan Statistical Areas[2] and subdivisions, and one for the remainder of the Nation. The second level of stratification is based on ownership and hospital size.

[1] AHA Annual Survey Database, Fiscal Year 2001 Health Forum LLC, Copyright 2003, One North Franklin Street, Chicago, IL 60606.

[2] Metropolitan Statistical Area is one category of Core Based Statistical Area (CBSA). The other CBSA category is the Micropolitan Statistical Area.

Metropolitan Statistical Areas and subdivisions. In order to accommodate a planned expansion of the metropolitan areas covered by DAWN, a maximum set of metropolitan areas, based on the definitions issued by the Office of Management and Budget (OMB) in June 2003, was selected. Which metropolitan areas to include was a topic of the DAWN redesign.[3] Retention of the existing 21 metropolitan areas was important because there was significant demand for estimates for those areas, and addition of the five most populous metropolitan areas in each of the nine Census divisions was deemed important to improve DAWN's geographic and population coverage. This yielded a total of 48 metropolitan areas. For many of the 48 metropolitan areas, the June 2003 definitions resulted in larger metropolitan areas. In some cases, these larger areas represented a merger of previously separate metropolitan areas. However, there continued to be strong interest among users of DAWN statistics in the areas covered by the original 21 metropolitan areas. In order to address the needs of these users, four of the merged areas were subdivided. For each of these areas, there was a sample for the metropolitan area, as well as a sample for each subdivision. This would enable DAWN to produce estimates for the metropolitan areas and for the subdivisions. As a result of this process, the final metropolitan-area sample included a total of 53 geographic units: 48 metropolitan areas, two subdivisions each for three of these metropolitan areas, and three subdivisions for one of these metropolitan areas.

This design recognized that, although each of the 53 geographic units was sampled, not every geographic unit would be active in DAWN at any particular point in time.[4] One more feature of the design was needed to preserve this flexibility. When any geographic unit was inactive, it had to be represented in the national estimate and, consequently, in the supplemental sample. Therefore, within each metropolitan area, hospitals were also sampled to serve as that metropolitan area's contribution to the supplemental sample.

Supplemental sample. The sample for the remainder of the Nation is referred to as the supplemental sample because it is designed to supplement the samples from the metropolitan areas to yield a national sample. The supplemental sample is, in effect, the 54th geographic unit for DAWN and is essential to achieve full coverage of the United States. The supplemental sample was formed by first dividing the United States into four Census regions. At any point in time, the supplemental sample provides coverage for all areas outside of the 53 metropolitan units described above, plus sample representation for the metropolitan areas where DAWN is not active.

Stratification by ownership and size. Within the geographic stratification scheme described above, hospitals were further stratified by ownership (public or private) and by size (based on the total number of emergency department visits reported for the hospital in the AHA Annual Survey Database). To begin, a cross classification was created by categories of ownership status and geographic unit. Within each combination of geographic area and ownership status, the number of hospitals determined the number of unique size categories. If there were three or fewer hospitals, only one size category was defined. If there were four, five, six, or seven hospitals, two size categories were defined. If there were eight or more hospitals, four size categories were defined. In the supplemental sample, within each combination of Census region and ownership, there were three size categories. This produced 24 unique strata from which to draw the hospitals for the supplemental sample.[5]

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3 Substance Abuse and Mental Health Services Administration, Office of Applied Studies. *Drug Abuse Warning Network, 2003: Interim National Estimates of Drug-Related Emergency Department Visits,* DAWN Series D-26, DHHS Publication No. (SMA) 04-3972, Rockville, MD, 2004.

4 This design took into account that expansion into additional metropolitan areas would occur over a period of time, but it has been similarly useful for contraction.

5 Four Census regions times two ownership categories times three size categories equals 24 strata.

Target levels of precision

DAWN defines precision in terms of the relative standard error (RSE) of an estimate. The RSE is the standard error of the estimate divided by the actual point estimate. DAWN is designed to have RSEs less than or equal to 10% for metropolitan area estimates and RSEs less than or equal to 15% for national estimates pertaining to total drug-related visits, cocaine visits, heroin visits, and marijuana visits. As discussed below, these desired precision levels are important drivers when setting sample size targets.

Sample size and sample allocation

Sample sizes for each geographic area were determined by the area's targeted precision level in combination with the theory of optimal allocation for stratified samples. According to this approach, the variance of the sample estimates will be minimized when the sample size, n_h, in each sampling stratum is made proportional to the quantity $W_h S_h / C_h$, where W_h is the proportion of sampling units, S_h is the population standard deviation for the parameter being measured, and C_h represents the square root of the cost of sampling in stratum h.

Using these optimum allocation conditions, the minimum required sample sizes necessary to achieve the targeted levels of precision in each DAWN area were calculated using the following general considerations:

- Geographic units for which estimates are desired (national and metropolitan areas described under Stratification),
- Precision level desired (see Targeted levels of precision),
- Specific types of estimates for which minimum precision is desired (e.g., estimates of total, cocaine, heroin, and marijuana ED visits), and
- Cost.

In addition to the above considerations, sampling rates (i.e., the number of sampled hospitals divided by the number of eligible hospitals) were also subject to the following constraints:

- First, if fewer than four hospitals existed in the stratum population, then all hospitals in the stratum were selected into the sample.
- Second, if the sampling rate for a particular stratum was greater than 90%, then all units in the stratum were selected into the sample.
- Third, if any calculations produced a sample size smaller than two hospitals, then the sample size was set to two hospitals.

Reduction of bias

Survey error is the extent to which findings from the survey sample differ from those of the population of interest. The statistical methodologies described above are designed to minimize error. There are additional sources of error, often referred to as bias, that also contribute to overall error. Measuring bias is difficult because it requires accurate knowledge about corresponding population values. The DAWN survey methodology includes proven techniques, practices, and protocols that reduce the potential for introducing bias. For example, clearly defined criteria are used to construct the initial hospital sampling frame. Coverage bias is minimized because the sampling frame has virtually

100% coverage of the target population. To minimize possible measurement bias, the individuals who collect data for DAWN are provided with specialized and intensive training, automated methods for data entry are used, and the data are subject to quality reviews at several points in the data collection process. Additional detail on the survey methodologies used to enhance DAWN data quality and reduce bias are provided in the DAWN 2003 interim estimates of drug-related ED visits.[6]

Sampling weights

As discussed above, the DAWN hospitals were selected using stratified simple random sampling with oversampling in the selected metropolitan areas. The strata sample sizes were determined through the optimum allocation process. Sampling weights are calculated as the inverse of the probability of selection. Then the sampling weights are adjusted for nonresponse and by a procedure known as poststratification or benchmark adjustment.

Weighting adjustment for nonresponse

Unit nonresponse occurs when hospitals fail to provide information or provide only partial information. To minimize the impact of unit nonresponse, the DAWN weighting plan includes nonresponse adjustment factors that were developed and applied within each weighting class. Weighting classes were formed based on the aforementioned sampling stratification schemes. Within each weighting class, the nonresponse adjustment factor was calculated as the sum of the sampled hospital weights divided by the sum of the weights of the responding hospitals. The nonresponse adjustment factors were checked to make sure the adjustments were within reasonable bounds. If a nonresponse adjustment factor was out of bounds (either too small or too large), adjacent weighting classes were collapsed and new nonresponse adjustment factors were calculated.

When the nonresponse adjustment factors were considered final, a nonresponse-adjusted sampling weight was then calculated. For responding hospitals, the nonresponse-adjusted sampling weight was calculated as the product of the nonresponse adjustment factor and the sampling weight. For nonresponding hospitals, the hospital nonresponse-adjusted sampling weight was set to zero. For each weighting class, a verification check was conducted to ensure that the sum of the nonresponse-adjusted sampling weights was equal to the sum of the sampled hospital weights.

Weighting adjustment for population benchmarks (poststratification)

The DAWN weighting plan also includes a poststratification adjustment factor that reconciles the weighted number of total visits for responding hospitals with the number of total visits from the most recent AHA Annual Survey Database. DAWN used a ratio adjustment within strata to implement this adjustment.

Poststratification strata were formed based on the aforementioned sampling stratification schemes. Within each stratum, the adjustment factor was calculated as the ratio of the AHA count of total visits to the weighted sum to total visits for responding hospitals. The factors were verified to ensure they were within reasonable bounds. If they were out of bounds (either too small or too large), adjacent poststratification strata were collapsed and new poststratification adjustment factors were calculated.

[6] Substance Abuse and Mental Health Services Administration, Office of Applied Studies. *Drug Abuse Warning Network, 2003: Interim National Estimates of Drug-Related Emergency Department Visits, Appendix B,* DAWN Series D-26, DHHS Publication No. (SMA) 04-3972, Rockville, MD, 2004.

When the poststratification adjustment factors were considered final, a poststratified weight was then calculated. The poststratified weight was calculated as the product of the poststratification adjustment factor and the nonresponse-adjusted sampling weight. For each poststratification stratum, a validity check was conducted to ensure that the sum of the weighted total visits was equal to the corresponding AHA count of total visits from each stratum.

Calculation of estimates

All estimates produced for this publication were calculated using data that had been weighted according to the plan described above. Estimates for any variable of interest were determined by summing the poststratified weights for all data records in question.

Variance estimation

Each hospital in the DAWN sample was selected through a random process, which theoretically could have been repeated many times resulting in many hypothetical samples. Sampling variance or the margin of error refers to the extent to which these samples vary. Two measures of this variability are the standard error (SE) and relative standard error (RSE), which is defined as the SE expressed as a percentage of the value of the estimate. The precision of an estimate is inversely related to the sampling variance, as measured by the RSE. The greater the RSE value, the lower the precision.

For example, if there are 10,000 estimated visits involving a given drug, and this estimate has an SE of 500 visits, then the RSE value is 5%:

RSE = SE/Estimate
RSE = 500/10,000
RSE = 0.05, or 5%.

In this publication, confidence intervals (CIs) are included in many of the tables and are often cited in the text along with the estimates. The 95% CI is calculated as:

CI = Estimate ± (1.96 x RSE x Estimate)

where 1.96 comes from the table of normal distribution z-values. Ninety-five percent of the normal distribution lies between the z-values of ±1.96.

Applying the formula to the example above, the 95% CI would be:

10,000 ± 1.96 x 0.05 x 10,000 = 10,000 ± 980.0
Lower limit: 10,000 – 980 = 9,020
Upper limit: 10,000 + 980 = 10,980
95% Confidence interval: 9,020 to 10,980.

If repeated samples were drawn from the same population of hospitals using the same sampling and data collection procedures, the true population value would fall within the confidence interval 95% of the time.

Variance estimates reported in this publication were determined using Taylor Series Linearization. Variance estimates were calculated using SUDAAN® software.

Standardized rates

Standardized measures are needed to make valid comparisons of estimates across age and gender categories. For age in particular, the size of the underlying population differs considerably across age groups; for example, the number of individuals age 18 to 20 in the U.S. is much lower than the number of individuals age 35 to 44. All other factors being the same, a higher estimate of ED visits would be expected to occur naturally for the group that is larger in the population.

To take the size of the underlying population into account, rates of ED visits or drugs per 100,000 population were calculated using population data from the U.S. Bureau of the Census.[7]

For each age and gender category, the estimate for a category was divided by the population for that category, which was then divided by 100,000. For example, consider an estimate of 1,000 visits for an age group of 1,000,000 persons and an estimate of 1,000 visits for an age group of 500,000 persons. The rates would be calculated as:

1,000 / (1,000,000/100,000) = 1,000 / 10
= 100 visits per 100,000 population

1,000 / (500,000/100,000) = 1,000 / 5
= 200 visits per 100,000 population.

Population estimates used to generate rates for this publication are provided in Appendix D.

Standardized rates were not calculated for race and ethnicity subgroups, because the race/ethnicity categories available to DAWN are much less detailed and contain considerably more missing data than the race and ethnicity categories in the Census data. Appendix E describes the race and ethnicity data reported for DAWN.

Publication criteria

DAWN can produce estimates for thousands of patient characteristics, visit characteristics, and drugs. However, some of these estimates are too imprecise or too small to be reliable. In these situations, the estimate was replaced by three dots (…) in the published table. Estimates were suppressed (i.e., not published) according to the following rules.

- The RSE of the estimate was greater than 50%.

When the RSE is greater than 50%, the lower bound of the 95% confidence interval approaches or includes the value zero. A confidence interval that includes zero means that the estimate is not statistically different from zero at this precision level.

[7] Population estimates for 2004, as of July 2005, from U.S. Census Bureau County Population Dataset CO-EST2004-ALLDATA (see http://www.census.gov/popest/counties/files/CO-EST2004-ALLDATA.csv).

- The estimated quantity was less than 30.

Estimates this small constitute rare events, which are based on a small number of cases and have precision levels that are difficult to quantify. In many instances, such rare events have variances so large that the estimate would be suppressed based on its RSE alone. Rare events that meet RSE criteria for publication are nonetheless based on very little data and are deemed too unreliable for publication.

- When an estimate was suppressed, an estimate or calculation using that estimate was also suppressed.

There are some estimates with an RSE equal to zero. This occurs when the number of ED visits being estimated is small and all the hospitals contributing to that estimate were selected with certainty, that is, their sampling probability is unity. Strictly speaking, there is no sampling error in such situations and the RSE is equal to zero. These results occur almost exclusively in situations with small numbers of ED visits, where the absence of any sampled hospital data is due to nonresponse and the small number of hospitals contributing to the estimates. In these situations, the necessary data are not available to approximate sampling errors.

APPENDIX C

GLOSSARY OF TERMS

This glossary defines terms used in data collection activities, analyses, and publications associated with the emergency department (ED) component of the Drug Abuse Warning Network (DAWN).

Accidental ingestion: This category of drug-related ED visits includes those involving the accidental use of a drug, for example, childhood drug poisonings and individuals who take the wrong medication by mistake.

Adverse reaction: This category of drug-related ED visits represents the consequences of using a prescription or over-the-counter (OTC) pharmaceutical for therapeutic purposes and includes visits related to adverse drug reactions, side effects, drug-drug interactions, and drug-alcohol interactions. Adverse reactions that involve a pharmaceutical with an illicit drug are exceptions that are excluded from this category.

Alcohol only (age less than 21): This category of drug-related ED visits includes those in which alcohol was the only drug involved and the patient was aged less than 21. Although alcohol is an illegal drug for minors, combining these cases with other cases involving illicit drugs tends to mask rather than highlight their importance for prevention and treatment efforts.

Case description: A description of how the drug(s) was related to the patient's ED visit. The case description, in conjunction with the presenting chief complaint and diagnoses, is used to determine if the ED visit is reportable to DAWN. It is copied verbatim from the patient's chart when possible.

Case type: See **Type of case**.

Case type other: See **Drug misuse and abuse**.

Confidence interval: A "confidence interval" (CI) is an interval estimate, that is, a range of values around a point estimate that takes sampling error into account. Ninety-five percent is an accepted standard of confidence. Technically, a 95% CI means that if repeated samples were drawn from the same population of hospitals using the same sampling and data collection procedures, the true population value would fall within the confidence interval 95% of the time. Practically, a 95% CI summarizes both the estimate and its margin of error in a straightforward way with a reasonable degree of confidence. Calculation of 95% CIs is discussed in Appendix B.

Diagnosis: The condition(s) for which the patient was treated as determined by the clinician after study. As many as four diagnoses can be entered for each DAWN case.

Disposition: The location or facility to which an ED patient was referred, transferred, or released.

Treated and released includes three categories:

- *Discharged home*—"Home" is used as a broad category to mean discharged to the patient's residence. Home is generally used for people who live locally; however, for students at nearby

universities, home means their university; for travelers who get sick on the road, it may mean their hotel or wherever they are staying, and so forth.

- *Released to police/jail*
- *Referred to detox/treatment*—The chart indicates that the patient was referred to a substance abuse treatment or detox program, facility, or provider.

Admitted to this hospital includes five categories of inpatient units:

- *ICU/critical care*
- *Surgery*
- *Chemical dependency/detox*
- *Psychiatric unit*
- *Other inpatient unit*—The inpatient unit was not specified or does not match one of the preceding units.

Other Disposition includes five categories:

- *Transferred*—The patient was transferred to another health care facility.
- *Left against medical advice*—The patient left the treatment setting without a physician's approval.
- *Died*—The patient died after arriving in the ED but before being discharged, admitted, or transferred.
- *Other*—The discharge status is documented in the chart but does not fit into any of the preceding categories.
- *Not documented*—The discharge status was not documented in the medical chart.

Drug: This refers to a substance that was recorded in a DAWN case report. Substances accepted by DAWN include alcohol, illicit drugs, prescription and over-the-counter pharmaceuticals, dietary supplements, and non-pharmaceutical inhalants. Multiple substances ("drugs") can be reported for each DAWN case. Therefore, the total number of drugs exceeds the total number of DAWN cases reported. (See also **Single-drug case**.)

Drug category: A generic grouping of pharmaceuticals and other substances reported to DAWN, based on the classification of Multum Information Services. Multum Information Services is a subsidiary of the Cerner Corporation and a developer of clinical drug information systems and a drug knowledge base. More information is available at http://www.multum.com/. In general, the Multum categories follow the therapeutic uses for prescription and over-the-counter pharmaceuticals.

Additional clarification is provided for the following drug categories:

- *Alcohol alone*—DAWN collects data on alcohol when used alone only if the patient is under age 21.
- *Alcohol-in-combination*—Alcohol-in-combination is the category for alcohol present with another reportable substance. DAWN does not gather data on alcohol used alone if the patient is over age 21. For patients 21 and older, alcohol must be used with another substance to be reported to DAWN. Alcohol-in-combination is reportable for all ages.
- *Amphetamines*—This class of substances has been extracted from the category of central nervous system (CNS) stimulants because of its importance as a major substance of abuse. For purposes of classification, "amphetamines" (plural) includes a class of compounds derived from or related to the drug amphetamine. Although some "designer" drugs fall into the class of amphetamines, we choose to report some of them individually as major substances of abuse (e.g., methamphetamine). This category does not include other CNS stimulants, such as caffeine or methylphenidate.

- *Combinations not tabulated above (NTA)*—This category includes combinations composed of two or more major substances of abuse that are mixed and taken together. For example, "speedball," which usually refers to the combination of heroin and cocaine taken at once, would be classified as a combination NTA, whereas heroin and cocaine used separately would be classified separately in the categories heroin and cocaine. Combinations consisting of a major substance of abuse and another substance are classified in the category of the major substance (e.g., heroin with scopolamine is classified as heroin).
- *Inhalants*—This category includes anesthetic gases and psychoactive non-pharmaceutical substances for which the documented route of administration was inhaled, sniffed, or snorted. Psychoactive non-pharmaceuticals fall into one of the following three categories: (1) **volatile solvents**—adhesives (model airplane glue, rubber cement, household glue), aerosols (spray paint, hairspray, air freshener, deodorant, fabric protector), solvents and gases (nail polish remover, paint thinner, correction fluid and thinner, toxic markers, pure toluene, cigar lighter fluid, gasoline, carburetor cleaner, octane booster), cleaning agents (dry cleaning fluid, spot remover, degreaser), food products (vegetable cooking spray, dessert topping spray such as whipped cream, whippets), and gases (butane, propane, helium); (2) **nitrites**—amyl nitrites ("poppers," "snappers") and butyl nitrites ("rush," "locker room," "bolt," "climax," "video head cleaner"); or (3) c**hlorofluorohydrocarbons** (freons). Anesthetic gases (e.g., nitrous oxide, ether, chloroform) are presumed to have been inhaled.

Drug misuse and abuse: A group defined broadly to include case types related to drug misuse or abuse. Additional clarification is provided for the following case types:

- *Overmedication*—This category was designed to capture non-medical use, overuse, and misuse of prescription and OTC medications that are not documented as drug abuse in the medical chart.
- *Malicious poisoning*—This category was designed to cases of drug use in which the patient was administered a drug by another person for a malicious purpose. Drug-facilitated sexual assault is one type of malicious poisoning, but other types of malicious poisonings such as product tampering would be classified in this category as well.
- Case type *Other*—This category includes all drug-related ED visits that could not be assigned to any of the other seven types. By design, most cases of documented drug abuse will fall into this category, and most cases in this category will involve use of illicit drugs or non-medical use of drugs and other substances.

Drug-related ED visit: Any ED visit related to recent drug use. This is the definition of a DAWN case effective January 1, 2003. To be a DAWN case, a drug needs only to be implicated in the visit; the drug does not have to have caused the visit. One patient may make repeated visits to an ED or to several EDs, thus producing a number of visits. It is impossible to determine the number of unique patients involved in the reported drug-related ED visits because no direct patient identifiers are collected by DAWN.

Estimate: A statistical estimate is the value of a parameter (such as the number of drug-related ED visits) for the universe that is derived by applying sampling weights to data from a sample.

Hospital emergency department (ED): The unit of a hospital established and staffed to provide emergency medical services. To be eligible for DAWN, the hospital must operate its ED(s) 24 hours a day, 7 days a week.

Malicious poisoning: See **Drug misuse and abuse.**

Metropolitan area: An area comprising a relatively large core city or cities and the adjacent geographic areas. Conceptually, these areas are integrated economic and social units with a large population nucleus. This DAWN publication utilizes areas defined by the Office of Management and Budget (OMB) in 2003, based on population data from the 2000 decennial Census.

Not otherwise specified (NOS): Catch-all category for substances that are not specifically named. Terms are classified into an NOS category only when assignment to a more specific category is not possible based on information in the source documentation (ED patient charts).

Not tabulated above (NTA): Designation used when categories are not presented in complete detail; smaller units are combined in the NTA category.

Overmedication: See **Drug misuse and abuse.**

***p*-value:** A measure of the probability (p) that the difference between two estimates could have occurred by chance, if the estimates being compared were really the same. The larger the p-value, the more likely the difference could have occurred by chance. For example, if the difference between two DAWN estimates has a p-value of 0.01, it means that there is a 1% probability that the difference observed could be due to chance alone.

Population: See **Universe.**

Precision: The extent to which an estimate agrees with its mean value in repeated sampling. The precision of an estimate is measured inversely by its standard error (SE) or relative standard error (RSE). In DAWN publications, estimates with RSEs greater than 50% are regarded as too imprecise to be published. ED table cells where such estimates would have appeared contain the symbol "..." (3 dots). (See also **Relative standard error**.)

Race/ethnicity: The Office of Management and Budget (OMB) is responsible for standard protocols for the collection of data on race and ethnicity by federal systems, including DAWN. In October 1997, OMB issued a revised standard protocol, which permitted separate reporting of race and Hispanic ethnicity, the ability to capture more than one race for an individual, modifications in nomenclature (e.g., "Black" was changed to "Black or African American"), division of certain categories ("Asian or Pacific Islander" was split into two categories, "Asian" and "Native Hawaiian or Other Pacific Islander"), and elimination of the "Other" category. For data collections, such as DAWN, where self-identification of the individual is not feasible, the revised OMB protocol also permitted a combined format, whereby race and Hispanic ethnicity would be recorded in a single data item, which could still record multiple entries for race and/or Hispanic ethnicity.

Since January 2003, DAWN has collected data on race/ethnicity using the combined format. The race/ethnicity categories on the DAWN data collection forms are as follows:

- *White*—A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.
- *Black or African American*—A person having origins in any of the black racial groups of Africa.
- *Hispanic or Latino*—A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race.

- *Asian*—A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.
- *American Indian or Alaska Native*—A person having origins in any of the original peoples of North and South America (including Central America), and who maintains tribal affiliation or community attachment.
- *Native Hawaiian or Other Pacific Islander*—A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
- *Not documented*—Used when documentation of race is not available from source records.

Despite the increased detail allowed by these categories and the provision for multiple entries, the actual race/ethnicity data reported to DAWN is quite limited because race and ethnicity are often not documented with this level of specificity in patient/decedent records. As a result, the classification used to tabulate DAWN data has a more limited set of categories, as follows:

- *White*—Anyone meeting the definition of white (above). Those who are identified as white and Hispanic are classified as Hispanic.
- *Black*—Anyone meeting the definition of black or African American (above). Those who are identified as black or African American and Hispanic are classified as Hispanic.
- *Hispanic*—Anyone whose ethnicity is Hispanic or Latino (above) is placed in the category Hispanic, regardless of race.
- *Race/ethnicity NTA*—This includes those categories that are too small to report independently including: 2 or more races, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander.
- *Unknown*—Race/ethnicity is unknown. Those who are identified only as Hispanic are classified as Hispanic.

Relative standard error (RSE): A measure of an estimate's relative precision. The RSE of an estimate is equal to the estimate's standard error (SE) divided by the estimate itself. For example, an estimate of 2,000 cocaine visits with an SE of 200 visits has an RSE of 10%. The larger the RSE, the less precise the estimate. Estimates with an RSE of 50% or more are not published by DAWN. (See also **Precision** and **Standard error**.)

Sampling: Sampling is the process of selecting a proper subset of elements from the full population so that the subset can be used to make inference to the population as a whole. A probability sample is one in which each element has a known and positive chance (probability) of selection. A simple random sample is one in which each member has the same chance of selection. In DAWN, a sample of hospitals is selected in order to make inference to all hospitals; DAWN uses simple random sampling within strata.

Sampling frame: A list of units from which the ED sample is drawn. All members of the sampling frame have a probability of being selected. A sampling frame is constructed such that there is no duplication and each unit is identifiable. Ideally, the sampling frame and the universe are the same. The sampling frame for the DAWN hospital ED sample is derived from the American Hospital Association (AHA) Annual Survey of Hospitals.

Sampling unit: A member of a sample selected from a sampling frame. For the DAWN sample, the units are hospitals, and data are collected for all drug-related ED visits at the responding hospitals selected for the sample.

Sampling weights: Numeric coefficients used to derive population estimates from a sample.

Seeking detox: This category of drug-related ED visits captures patient seeking substance abuse treatment, drug rehabilitation, or medical clearance for admission to a drug treatment or detoxification unit. They are classified separately because they often reflect administrative practices that vary across hospitals and may vary over time within the same hospital. Seeking detox visits tend to be concentrated in those facilities that operate specialized inpatient units providing substance abuse treatment or detoxification services, and the largest numbers are found in facilities that require medical clearance for entry into such treatment to be granted in their EDs.

Single-drug case: A single-drug case is one in which only one drug was involved. Because multiple substances may be recorded for each DAWN case (see **Drug**), readers should be cautious in interpreting the relationship between a given drug and the number of associated visits or deaths. For example, if the source record for a patient/decedent documented marijuana use, this does not mean that marijuana was the only drug involved in the visit/death or that the marijuana caused the visit/death. One should always consider whether and how many other drugs were used in combination. Even then, attributing a causal relationship between the visit/death and a particular drug may not be possible. DAWN only captures single-drug visits/deaths involving alcohol if the decedent was younger than age 21.

Standard error (SE): A measure of the sampling variability or precision of an estimate. The SE of an estimate is expressed in the same units as the estimate itself. For example, an estimate of 10,000 visits with an SE of 500 indicates that the SE is 500 visits.

Statistically significant: A difference between two estimates is said to be statistically significant if the value of the statistic used to test the difference is larger or smaller than would be expected by chance alone. For DAWN ED estimates, a difference is considered statistically significant if the *p*-value is less than 0.05. (See also ***p-value***.)

Strata (plural)**, stratum** (singular)**:** Subgroups of a universe within which separate ED samples are drawn. Stratification is used to increase the precision of estimates for a given sample size, or, conversely, to reduce the sample size required to achieve the desired level of precision. The DAWN ED sample is stratified into metropolitan area cells plus an additional cell for the remainder of the United States. To ensure thorough coverage within metropolitan areas, the universe of hospitals in each is allocated into substrata identified by (a) two types of hospital ownership (public, private) and (b) up to four size categories (measured in terms of annual ED visits), creating up to eight substrata in each metropolitan area stratum. Hospitals in the stratum that covers the rest of the United States are stratified first by Census region, then by state, type of ownership, and size (also measured in terms of ED visits). A systematic sample is selected from each of the geographic strata.

Suicide attempt: This category of drug-related ED visits captures suicide attempts (e.g., "attempted suicide," "tried to kill self") documented in the medical record in which drug use was involved, including non-medical use of prescription or OTC pharmaceuticals. Suicidal gestures, thoughts, or ideation, including attempts to "harm" self, are assigned to another case type.

Type of case: A classification used to group similar DAWN cases from the diverse set of all drug-related ED visits. Each case is coded into one and only one category, the first that applies from the following hierarchy: suicide attempt, seeking detox, alcohol only (age < 21), adverse reaction, overmedication, malicious poisoning, accidental ingestion, and other. The rules for assignment of DAWN cases to types of cases are defined in the DAWN ED Decision Tree.

Universe: The entire set of units for which generalizations are drawn. The universe for the DAWN ED sample is all non-Federal, short-stay, general medical and surgical hospitals in the United States that operate one or more emergency departments 24 hours a day, 7 days a week. Specialty hospitals, hospital units of institutions, long-term care facilities, pediatric hospitals, hospitals operating part-time EDs, and hospitals operated by the Veterans Health Administration and the Indian Health Services are excluded. The universe of EDs is identified from the American Hospital Association's Annual Survey Database.

APPENDIX D

POPULATION DATA

Table D1

Population by age and gender: 2004[1]

Age	Total U.S.	Males	Females
Total	**293,655,404**	**144,537,408**	**149,117,996**
0-5 years	23,923,026	12,232,272	11,690,754
6-11 years	23,985,999	12,277,377	11,708,622
12-17 years	25,368,973	12,995,499	12,373,474
18-20 years	12,350,179	6,358,864	5,991,315
21-24 years	16,894,923	8,697,646	8,197,277
25-29 years	19,560,906	9,994,814	9,566,092
30-34 years	20,471,032	10,341,219	10,129,813
35-44 years	44,108,652	22,033,881	22,074,771
45-54 years	41,618,805	20,452,673	21,166,132
55-65 years	29,078,924	13,999,433	15,079,491
65 years and older	36,293,985	15,153,730	21,140,255

[1] Population estimates for 2004, as of July 2005, from U.S. Census Bureau County Population Dataset CO-EST2004-ALLDATA (see http://www.census.gov/popest/counties/files/CO-EST2004-ALLDATA.csv).

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).

APPENDIX E

RACE AND ETHNICITY IN DAWN

In October 1997, the Office of Management and Budget (OMB) issued a revised standard protocol for race and ethnicity categories used in Federal data collection systems[1]. The new protocol permitted separate reporting of race and Hispanic ethnicity, and it incorporated the ability to capture more than one race for an individual, a few modifications in nomenclature (e.g., "black" was changed to "black or African American"), division of certain categories ("Asian or Pacific Islander" was split into two categories, "Asian" and "Native Hawaiian or Other Pacific Islander"), and elimination of the "Other" category. For data collections, such as DAWN, where self-identification of the individual is not feasible, the OMB protocol also permitted a combined format, whereby race and Hispanic ethnicity would be recorded in a single data item, which could still record multiple entries for race and/or Hispanic ethnicity. The complete DAWN ED case form, which adopted the combined format in 2003, is reproduced in Figure 2 in this report.

Despite the increased detail allowed by the new categories and the provision for multiple entries, the actual race/ethnicity data extracted from source records and submitted to DAWN is quite limited. This is because the source documents (that is, the ED medical records from which DAWN data are abstracted) rarely contain such detailed information on race/ethnicity of patients.

For reference, estimates of drug-related ED visits by race/ethnicity are presented in Table E1. This analysis, which is based on the most detailed coding of race/ethnicity in DAWN case reports, reveals that estimates for the following categories are too small to be meaningful:

- Multiple (i.e., two or more) races/ethnicity (that is, two or more races/ethnicity were documented in the source record for the same individual),
- Hispanic or Latino ethnicity with any specific race indicated,
- American Indian or Alaska Native,
- Asian, and
- Native Hawaiian or Other Pacific Islander.

Therefore, in the tables of estimates in this and other DAWN publications we have retained a more limited set of categories: White, Black, and Hispanic. A fourth category called "Race/ethnicity not tabulated above (NTA)" is used to tabulate those categories that are too small to report independently.[2] All cases reported to DAWN as Hispanic or Latino ethnicity are tabulated as Hispanic race/ethnicity, regardless of race.

This lack of detailed race and ethnicity data in DAWN case reports also prevents us from generating rates per 100,000 population for race and ethnicity categories. Data from the 2000 decennial Census were collected and are being tabulated according to the revised race and ethnicity protocol and are therefore incompatible with DAWN estimates.

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[1] See Office of Management and Budget, Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity, *Federal Register, 62* FR 58782, October 30, 1997.

[2] One exception is that if two races are reported and the second is reported as unknown, the episode is coded for the known race.

Table E1

Drug-related ED visits, by detailed race/ethnicity: 2004

Race/ethnicity	Estimated visits[1,2,3]
Total drug-related ED Visits	**1,997,993**
One race/ethnicity	1,989,924
White	1,148,616
Black/African American	366,017
Hispanic	167,679
Asian	4,740
American Indian/Alaska Native	9,578
Native Hawaiian/Other Pacific Islander	2,373
Race Unknown	290,921
Two races/ethnicitles	8,060
White + Black/African American	821
White + Hispanic	6,506
White + Asian	40
White + American Indian/Alaska Native	102
White + Native Hawaiian/Other Pacific Islander	...
Black/African American + Hispanic	359
Black/African American + Asian	...
Black + Native Hawaiian/Other Pacific Islander	...
Black/African American + American Indian/Alaska Native	...
Hispanic + Asian	...
Hispanic + American Indian/Alaska Native	30
Asian + American Indian/Alaska Native	...
Asian + Native Hawaiian/Other Pacific Islander	...
American Indian/Alaska Native + Native Hawaiian/Other Pacific Islander	166
Three races/ethnicities	...
White + Black/African American + Asian	...
White + Latino + American Indian/Alaskan Native	...
Six races/ethnicities	...
White + Black + Latino + Asian + American Indian/Alaska Native + Native Hawaiian/Other Pacific Islander	...

1 These are estimates of ED visits based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the U.S.

2 Estimates are all expressed in visits.

3 Three dots (…) indicate that an estimate with an RSE greater than 50% has been suppressed or an estimate less than 30 has been suppressed.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004 (09/2005 update).